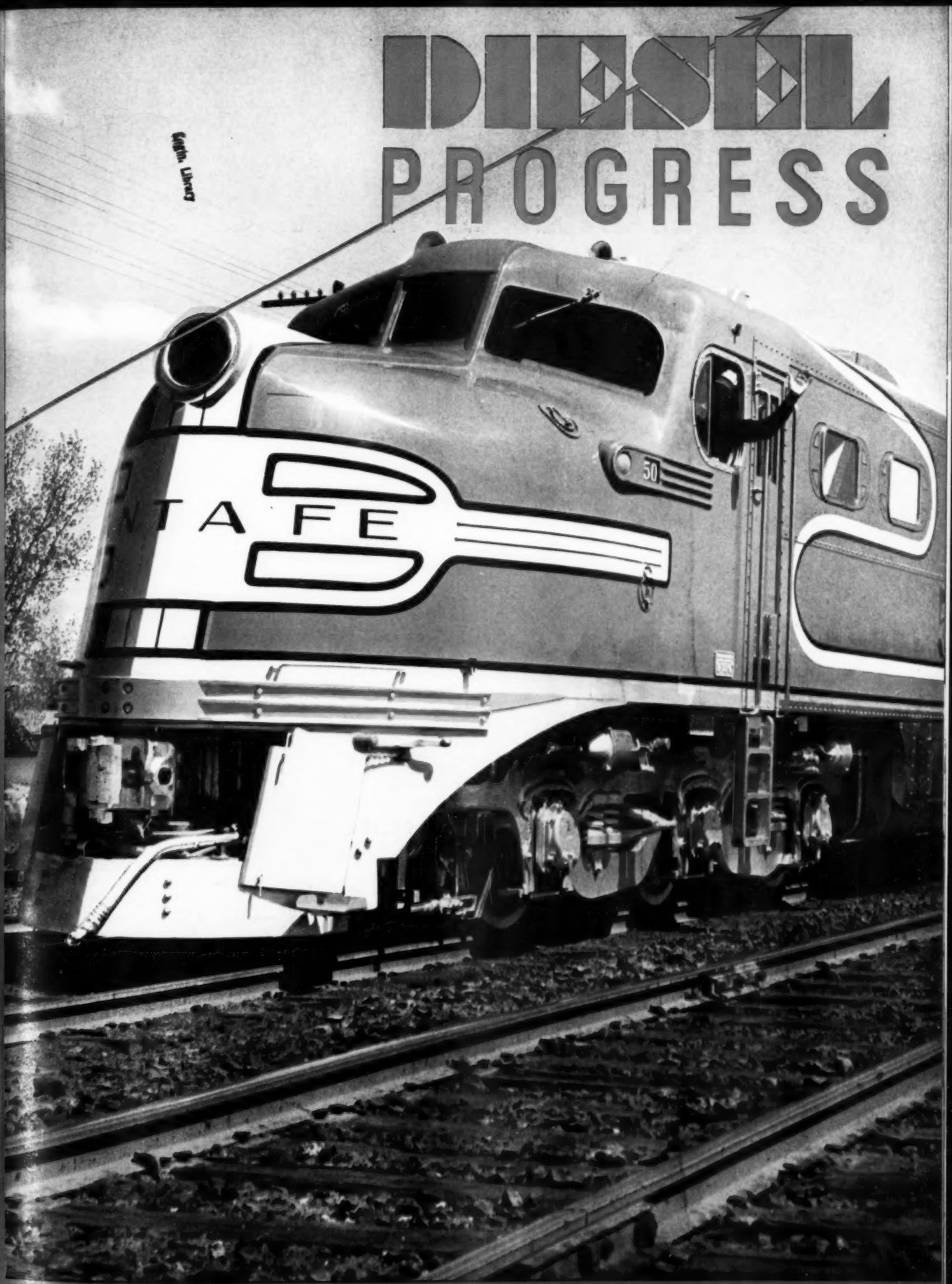
DIESEL PROGRESS



JULY, 1941

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DIESEL and GAS ENGINE PROGRESS

REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION: An Alco-G.E., 4000 hp. Diesel-electric locomotive, designed and built jointly by the American Locomotive and General Electric Companies, to haul the Santa Fe's "Super Chief" de luxe passenger train between Chicago and Los Angeles. See article on pages 34 and 35 of this issue.

TABLE OF CONTENTS ILLUSTRATION: Three new Diesel trucks recently delivered by Reo Motors, Inc., to Kroger Grocery & Baking Company for service in Michigan. The bodies, 14' long, 7' wide, and 7½' high, are insulated and refrigerated. The engines are Buda-Lanova 6 cylinder Diesels.

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HEYWORTH CAMPBELL
Art Director

JULY CONTENTS

THE F. & M. SCHAEFER BREWING CO.

By WILBUR W. YOUNG

ONLY one year short of a century is the present age of F. & M. Schaefer Brewing Company, Brooklyn, N. Y., and to maintain continuous operation through the last ninety-nine years, especially to hold a brewery together through the vicissitudes that were peculiar to that business during the prohibition years, was not so much a piece of wizardy as it was the evolution of a conservative and sound policy.

Now the fourth largest producer in the field, this company does all of its business within a radius of one hundred miles of New York City —a noteworthy fact in comparison to the national distribution achieved by the few that top The F. & M. Schaefer Brewing Co.

Never given to the spectacular in advertising and promotion, but always consistent in maintenance of quality in its product, The F. & M. Schaefer Brewing Co. weathered the prohibition days by producing near beer, dyestuffs, and ice. With the return of legalized beer, a plant modernization program was started, which, by the way, has never stopped, and Schaefer staked its future in the now familiar slogan, "Our hand has never lost its skill."

Now, Diesel engines are not unique to the brewing industry, but due to the large quantity of steam which is required in the manufacture of beer, it is natural that a preponderance of steam prime movers is found in the power plants of our breweries. But the inherent dependability of Diesels in the ultimate emergency is better exemplified in such unusual applications as this.

The reasons for installing a Diesel in this thoroughly steamized plant are best set forth by Mr. Fred Ophuls, President of Fred Ophuls & Associates, Inc., New York, the consulting engineers of record for The F. & M. Schaefer Brewing Co., who says, "While, under our supervision and according to our design, a complete steam driven plant was installed by our client, there are some operations connected with the shipment of beer which will be very much handicapped or entirely brought to a standstill if the power plant fails. This is particularly true of the racking of the beer into barrels and shipment of bottled and draught beer. Certain machinery needs to be run so that deliveries of beer to the trucks can be made. While our client does not expect any breakdown of the steam plant, he wants to make doubly certain that the delivery part of the plant can be operated under most any circumstances and this is the main reason why the 300 kw. Diesel engine generator set has been installed. An-

Top view: products of the "Hand That Has Never Lost Its Skill." Above: newest addition to Schaefer's large fleet of trucks, a General Motors Diesel tractor. Right: the new turbine and De La Vergne Diesel generating units recently added to the Schaefer power plant.

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other thought which our client had in this connection was to operate this Diesel engine set when the brewery is not manufacturing beer and only electric current is required for lights and small motor operations. The latter use of the Diesel engine would occur mostly in the winter time on Saturday and Sunday because even if the brewhouse was shut down on these two days in the summer time, refrigeration would be necessary to keep the cellars and the beer at a proper temperature. Our experience with the engine seems to indicate that we have been able to fulfill these requirements with the machine that we have installed." This is a 6 cylinder, 4 cycle, De La Vergne engine rated 600 bhp. at 600 rpm., direct connected to a 300 kw. normal load Crocker-Wheeler DC. generator, which has a 25% overload rate. The engine governor is a Woodward and cylinder exhaust temperatures are indicated by an "Alnor" six point pyrometer with thermocouples of the same make. Both exhaust and intake silencers are Maxim and the intake filter is an American. Built-in and attached engine accessories include fuel injection system by American Bosch; Purolator fuel and lube filters; and U. S. Gauge jacket water thermometers. The Schaefer power plant is in charge of Mr. E. R. Sullivan, Plant Engineer, and Mr. J. W. Wolf, Operating Engineer.

Right: The new bottling plant, brew house, and office building follow distinctively modern lines. Below: Rudolph J. Schaefer II.

DIESEL TOWBOAT "ASHLAND

IF Hollywood publicity experts were to have described the new *Ashland* at the time of her recent trial runs in Chicago, they would have undoubtedly characterized her as "Super Deluxe," for she sets an even newer standard in modern river towboat design, being even more up-to-date than her sister ship, the *Jim Martin*, put in river service a year ago, and she embodies many of the appointments of an ocean-going luxury liner.

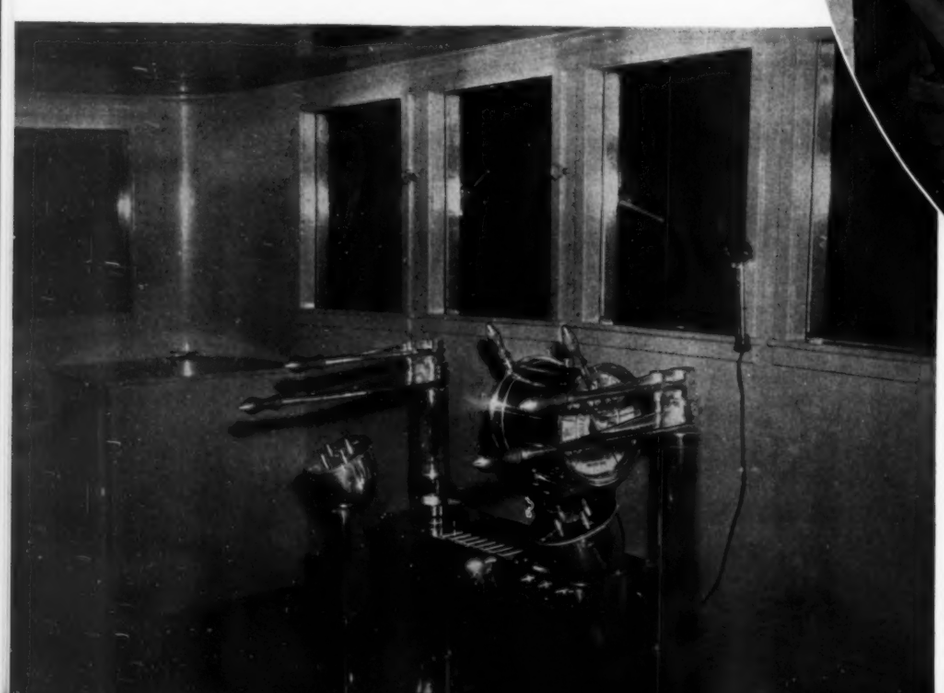
This new all Diesel river towboat was designed and built by the Calumet Shipyard and Dry Dock Company in Chicago, with A. M. Deering, Naval Architect of Chicago as consultant for the Ashland Oil and Refining Company of Ashland, Kentucky. Collaborating in her design and construction were Paul G. Blazer, President, James L. Martin, Chairman of the Board, and M. C. Dupree, Transportation Manager of the owning company. She is named after the city in which the company's headquarters are located.

The streamlined hull of the *Ashland* is of the twin screw, tunnel-type. Dimensions are 145 feet in length, 31 feet in breadth and 8 feet, 9 inches in depth, and construction of the hull is of all-welded steel. She is the largest river towboat ever built in the Chicago area. She is propelled by twin 3-blade propellers.

The "Ashland" is equipped with six rudders. Her two forward rudders are exceptionally large and located aft of each propeller. The four flanking rudders, two of which are located forward of each propeller, give unusually quick maneuverability. As a matter of fact, the rudders can go from hard-over to hard-over in eight seconds. All rudders are controlled from individual levers in the pilot house with provision for manual single lever control through the insertion of an interlocking pin.

The steering rams are designed by Calumet Shipyard and Dry Dock Co. They are of the air hydraulic type. Two pumps furnished by the Tuthill Pump Company with Fairbanks-Morse motors automatically control the pressure on the system by means of Cutler-Hammer switches. One unit is designed to cut in at low pressures, while the other responds to higher pressures.

Stepping below to the engine room brings a further agreeable surprise because of the unusual amount of space surrounding the main engines in this type of towboat. This has been accomplished by putting all auxiliaries in a special room forward of the main engine room and separated from it by a steel bulkhead. Here are located the two before-and-after pumping units, the Fairbanks-Morse fire pump, and other



Engine room view showing the 805 hp. F-M propulsion Diesels. Note Burgess exhaust Snubbers and Weston tachometer on the board.

Pilot house view showing the controls, engine room signal, Weston tachometer.

Bow view of the "Ashland."

HENRY J. BARBOUR

auxiliary equipment usually found "scattered" about the main engine room. This special "pump room," as it is called, is thoroughly ventilated as is the main engine room with blowers by the American Blower Company.

Propulsion is by means of twin Fairbanks-Morse, 7-cylinder, Diesels rated at 805 hp. each. Both engines are maneuvered from a single control stand between the two so that both may be operated by one man. Burgess Exhaust Snubbers, located in the stack, are installed for both main engines and the two auxiliary engines. Two Louis-Allis 30 kw., direct current marine type generators, driven off the main engine tail shafts through Dodge V-belt drives, furnish electric power when the main engines are operating.

Auxiliary power is provided by two 6-cylinder Buda Diesel engines, direct-connected to two 40 kw. marine type Burke generators. Closed cooling systems with Schutte & Koerting heat exchangers and F-M reversible circulation pumps are provided for all engines. Motor-driven auxiliaries include a fire pump, two raw water pumps, and two before-and-after pumps. A motor-driven compressor supplies starting air for the main Diesels.

Fresh water for general use is taken directly from the river and goes through an Elgin pressure filtering system and chlorine metering system thus making the boat independent of shore sources of water supply. A Foamite fire system with fire stations fore and aft provides protection throughout the boat.

Leaving the engine room and climbing the convenient staircase to the texas, one finds four beautiful cabins, three with upper and lower berths and one guest salon including combination lounge and cabin. Three baths, one of which is located between two adjoining cabins, are provided for the comfort of the guests, with all baths finished in Masonite tile in various colors. Forward of the texas house on the texas house deck is an observation deck for guests, while aft of the texas house is a sun deck.

The pilot house is finished in sea-green Masonite, with specially designed floor with the name of the vessel inlaid therein. The hydraulic steering control pedestals in polished bronze with independent levers for both go-ahead and flanking rudders are conveniently located. The panel board consists of Weston electric Tachometers together with various switches including two 19-inch diameter searchlights with Carlyle & Finch remote controls, and two 15-inch diameter flood lights, set port and starboard on the flying bridge. The pilot house also includes a loud-speaker system to issue instructions to the men working on the barges.

FISHERS ISLAND, NEW YORK

By H. L. FERGUSON, JR.

THIS delightful and very popular summer resort island, having an area of some three thousand acres, lies in Long Island Sound two miles off the Connecticut shore between New London, Connecticut, and Montauk Point, Long Island. Being distinctly a seashore resort with exceptional boating and bathing facilities which are easily accessible from all points, its population fluctuates with the seasons, expanding from some 2,000 in the winter to 4,500 during the summer months. It was the frequent inconveniencing of this large summer population through interruption of electric service resulting from accidents to the submarine supply cable and storms on the mainland that prompted the progressive management of Fishers Island Electric Corporation to install a Diesel generating plant on the Island itself: a thoroughly modern and most interesting plant, as you will see. But first a bit of the history leading up to this venture:—

By 1899, when the new owners of Fishers Island had first begun to see results from their planning and efforts, it became apparent that the convenience of electric lighting was both desirable and necessary. Ten of the principal property owners formed the Fishers Island Electric Power and Heating Company and built a steam generating plant, starting operations with 199 customers. This Company was dissolved in 1915 and its assets were taken over by Fishers Island Farms, Inc., then owning practically all of the Island and now controlling the utilities, real estate, and various interests.

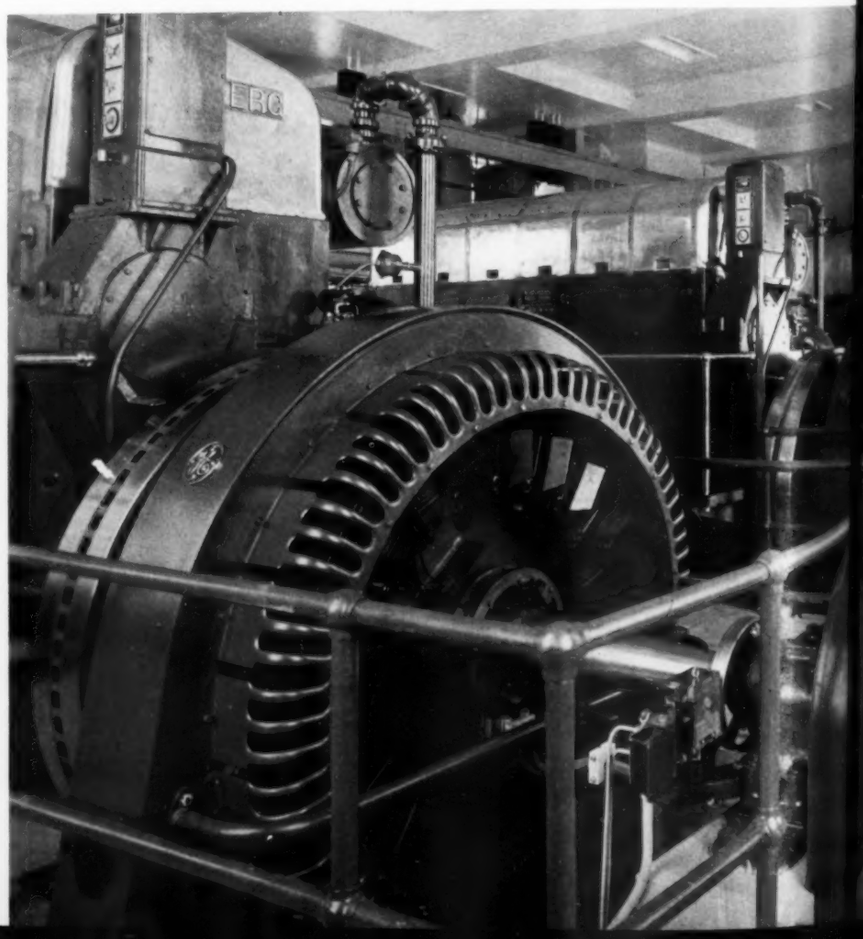
In 1922, the power plant was found inadequate for increasing demands and was abandoned in favor of electric service from Groton, Connecticut, by way of a steel armored submarine cable, 13,800 ft. long. In 1926, the original cable was replaced by a new one and another cable was laid as an emergency measure. It was in November, 1940, that all properties of the electrical supply system were consolidated and taken over by the present Fishers Island Electric Corporation.

At this point the new Corporation picked up a movement which had been started by the Farms, that of exploring the possibilities of a local generating plant. Consulting engineers were employed to study the situation and, in due time, they submitted recommendations for a Diesel generating plant on the Island to eliminate the troublesome cable supply from the mainland. The consultants were faced with many abnormal conditions in developing a workable plan, the most obvious of which was that the summer demand is virtually double that of the winter months. For example, in February and April of 1939, the peak demand was 240 kw. whereas in September of the same year, the peak reached 582 kw. They also found that the normal demand has increased to the extent that 1941 average requirements will be considerably higher than those of 1939, during which year the total consumption was 1,250 000 kwh. The problem of determining the optimum capacity of a plant for these conditions, with virtually no industrial load as a backlog, is obvious. Furthermore, every item of material and equipment for a new plant had to be purchased on the mainland, shipped to New London, and transported to the Island.

The ultimate solution resulted in the installation of four Diesel generating units of 200 kw. capacity each on the calculation that one unit will efficiently handle the average winter load of 150 kw. and that no more than three units would be required for the maximum summer peak load, there always being one unit or more in reserve. This seemed to be an ideal arrangement for rendering this electrical source for Fishers Island both efficient and dependable, the latter factor being paramount because of the detached location.

The new plant went on the line February 9, 1941, with two generating units in service. The

View of the generator ends of the four units at Fishers Island.



other two units were subsequently installed and, at this writing, the plant is complete and ready for the heavy summer load. The Diesels are four, totally-enclosed Nordbergs, of 6 cylinders each, 10½" bore, 15" stroke, 4 cycle, solid injection, rated 300 bhp. at 400 rpm. The four 200 kw. General Electric generators are direct connected to the engines with exciters V-belt driven from the generator shaft extensions.

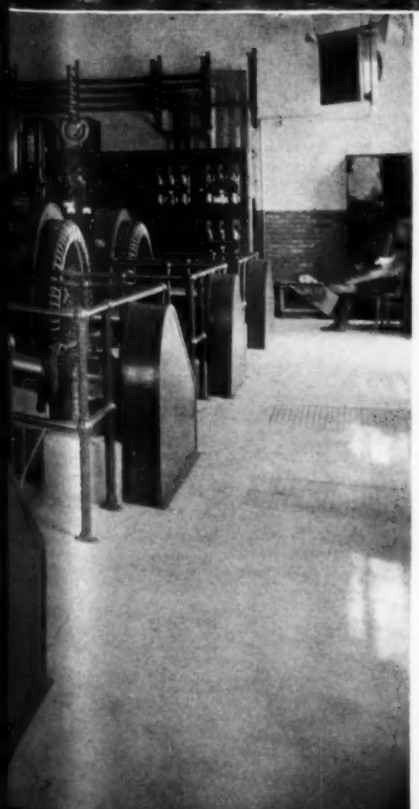
The four trim looking power units are equipped with all modern engine-mounted protective devices and operating accessories including force-feed mechanical cylinder lubricators, duplex lube and fuel oil filters, fuel oil pumps, lube oil coolers, jacket water thermometers, pyrometers, air and oil pressure gauges, isochronous governors and safety control alarm switches which function on excessive jacket water and exhaust temperatures as well as in the event of low lube oil pressure. In the engine foundation pit, just beneath the floor plates, are the four shell and tube type heat exchangers, fitted to the closed fresh water jacket cooling systems. Four motor-driven double acting plunger pumps draw sea water from the harbor 200 feet distant for cooling and, after passing through the water and oil heat exchangers, the sea water is returned to the harbor. Fuel oil is taken from tankers at the boat dock through a 3" line to two 10,000 gal. underground tanks at the rear of the plant.

Starting air for the Diesels is supplied at 250 lbs. per sq. in. by a motor driven compressor and, to meet emergencies, a duplicate compressor is installed with gasoline engine drive. Also attached to the latter unit is a small 120 V generator for emergency lighting and plant accessory services.

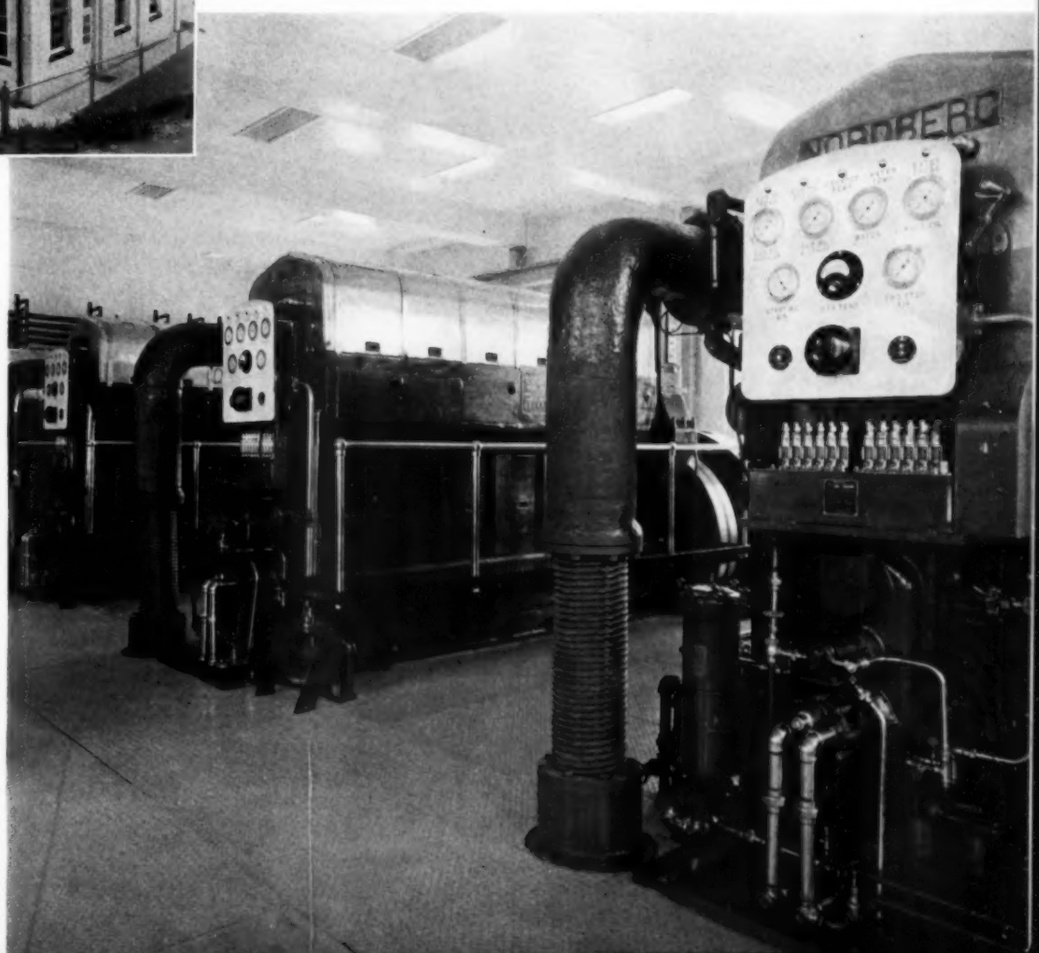
In general layout and appearance, the plant is exemplary. The four Diesel generating units are arranged parallel on the main floor, with the switchboard extending across one end of the room. On a quarter mezzanine are mounted the day tanks, cooling system surge tank, and starting air bottles. Under the mezzanine are grouped the cooling water pumps, air compressors, fuel oil hand pump and initial filter, centrifugal lube oil reclaimer, and sea water strainer. Both intakes and exhausts are carried under the floor to the rear of the building. Intakes are through filters mounted directly on Snubbers and directly beside each intake is the exhaust silencer for the corresponding engine. The sub-station occupies a small enclosure just back of the plant. All machinery and the plant interior is finished in light grey enamel which creates a clean-cool atmosphere. Excellent planning is seen in every detail of arrangement and the general shipshape condition of this plant probably reflects the previous long marine experience of Chief Engineer L. S. Baldwin.

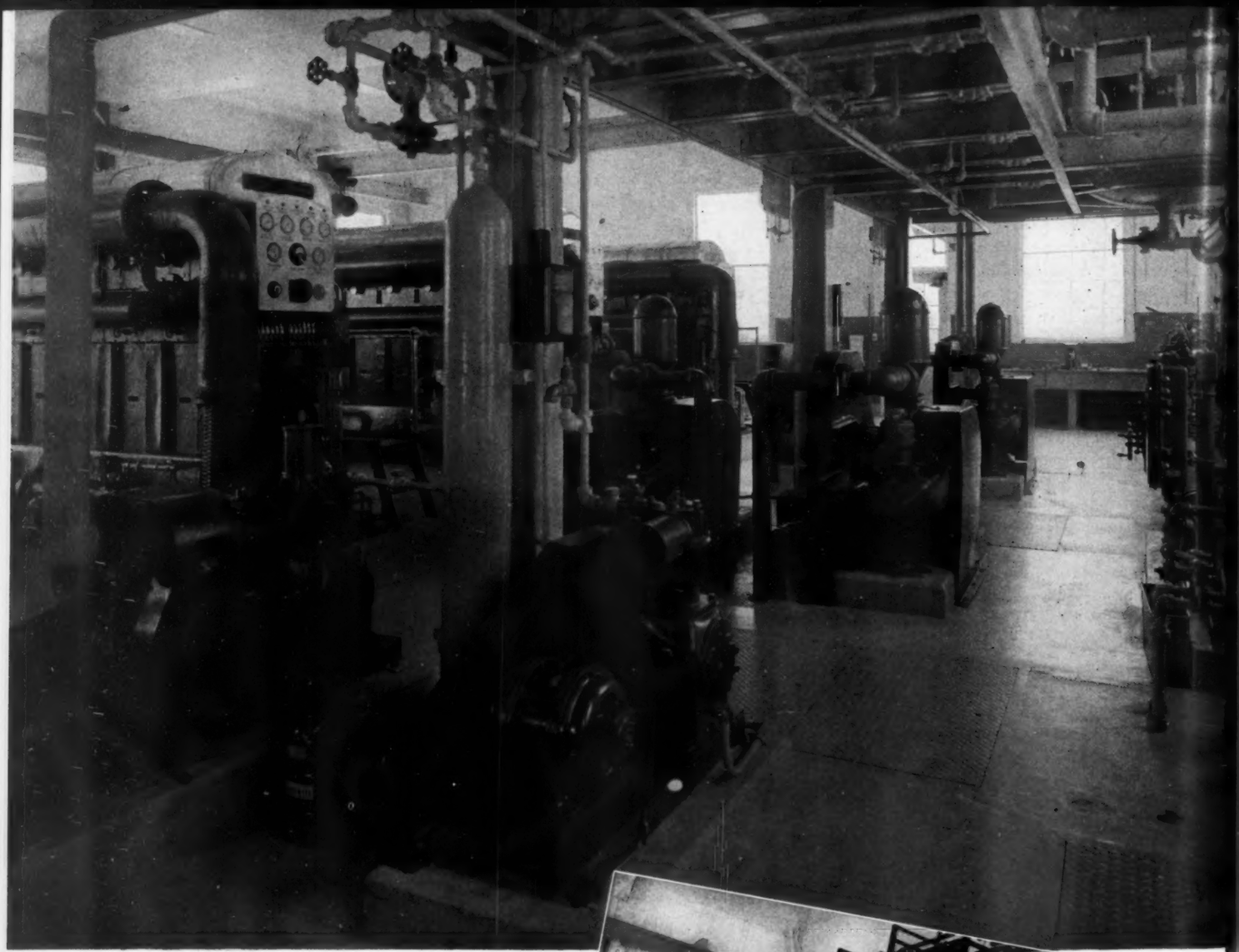
The immediate effect of this plant will be manifest in uninterrupted service to the inhabitants of Fishers Island, particularly through the summer months at hand when electric storms on the mainland previously and frequently caused shut-offs of three to four hours' duration. As time goes on, the economies of local Diesel generation will be felt and will result in the inevitable freer use of current throughout the island.

Rear of the plant showing Burgess intake Snubbers, American air filters, Maxim exhaust silencers, and substation.



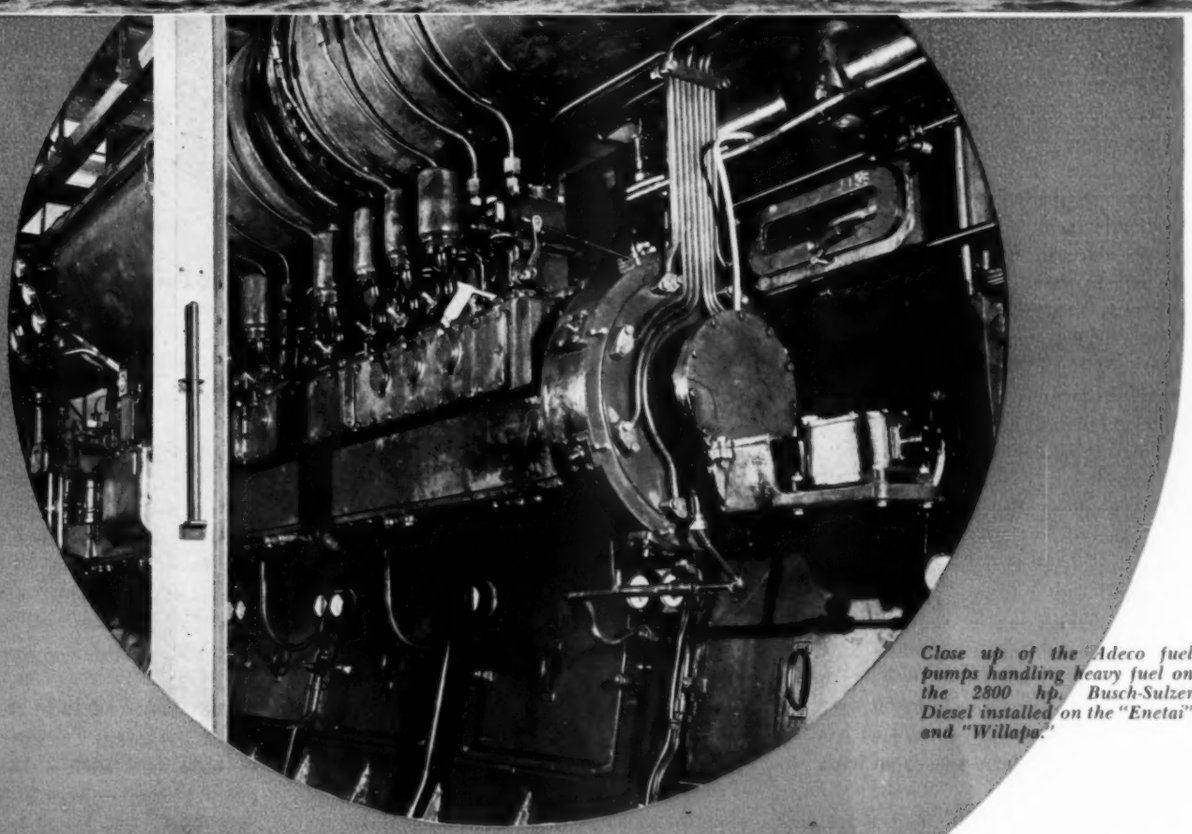
Control end of the Diesels, showing Alnor pyrometers, Manze lubricators, Nugent fuel and lube filters.





Notable elements in the equipment of Fishers Island's new power plant are: Diesel engines by Nordberg; generators, exciters and switchboard equipment by General Electric; switchboard erection by John Gallagher, New York; governors by Woodward; air compressors by Quincy; chain hoist over engines by Yale; initial fuel oil filter by W.G.B.; engine mounted fuel and lube filters by Nugent; lube oil reclaimer by Goulds; fuel oil meter by Neptune; lube oil by Socony Vacuum; lube oil coolers by Schutte & Koerting; mechanical lubricators by Manzel; cooling water strainer by Elliott; sea water pumps by Goulds; jacket water heat exchangers by Griscom-Russell; jacket water thermometers by Motoco; auxiliary generator by Marble-Card; alarm and safety controls by Viking; pyrometers by "Alnor;" exhaust silencers by Maxim; intake Snubbers by Burgess and intake air filters by American. The consulting engineers were B. F. Wood of Stevens & Wood, associated with Baker & Spencer, New York.

Top view shows arrangement of Quincy air compressors, foreground, cooling water pumps, center, lube oil reclaimer, right, with all exposed piping under the mezzanine, above. Three of the Diesels are seen, left. Directly above: The G-E equipped switchboard.

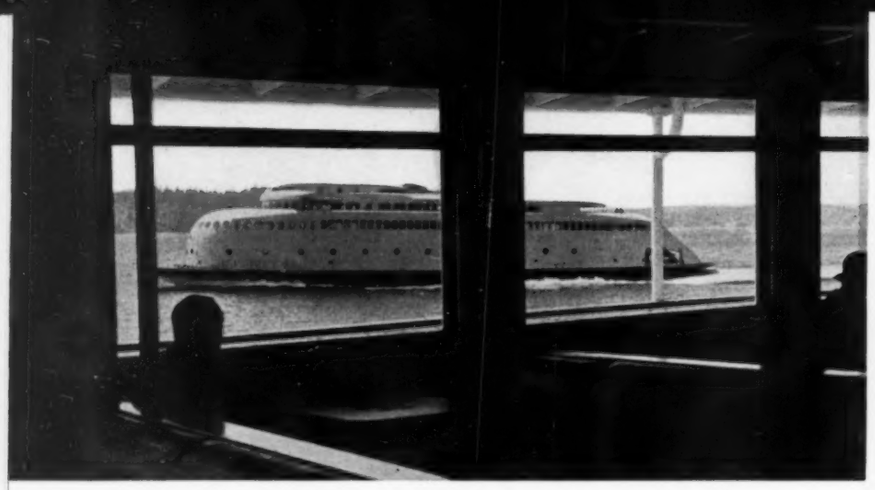


Close up of the Adeco fuel pumps handling heavy fuel on the 2800 hp. Busch-Sulzer Diesel installed on the "Enetai" and "Willapa."

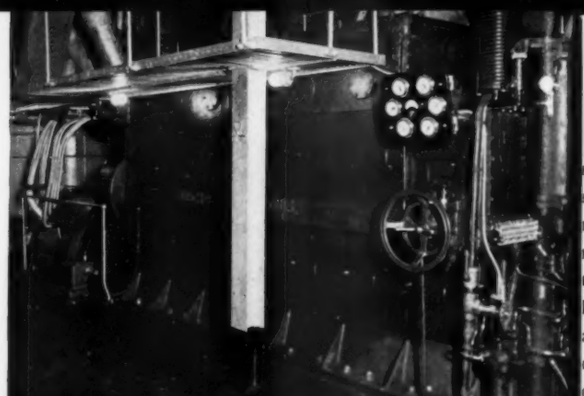
TWO MORE FOR CAPT. PEABODY

By CHAS. F. A. MANN

THE far-flung ferry system of the Puget Sound Navigation Co., so ably headed by Capt. Alexander M. Peabody, serving those unbridgeable routes connecting the mainland with the vast Olympic and Kitsap-Pierce County Peninsulas to the West, received two more noteworthy additions in May and June, the Diesel ferries *Willapa* and *Enetai*. Eight years ago the historic steam ferry *Chippewa*, itself once a Great Lakes steamer, made world history when she was converted to the first direct drive Diesel ship with a two-cycle, separately scavenged Busch-Sulzer engine. In 1935, the success of the *Chippewa* installation of 2,200 hp. led to the famed streamlined ferry *Kalakala*, with a 10 cylinder 3,000 hp. Diesel installation. Since that time, operating on the busy Seattle-Bremerton route, carrying millions of Navy Yard workers and Navy personnel, these historic Diesel ferries have, together, piled up nearly 2,000,000 miles with repair work being



Illustrating the wide plate glass windows on the converted "Willapa" and "Enetai." Passing vessel is the P.S.N. streamlined Ferry "Kalakala."



Six cylinder, 450 hp. Busch-Sulzer, 4 cycle auxiliary unit as installed on both the "Willapa" and "Enetai."

done between midnight and 6 A.M. only, while they plow back and forth seven days per week, eighteen hours per day.

The war-rush at the Navy Yard, together with heavy increase of local population in Kitsap County, has made it necessary to give practically fifteen minute service in rush hours and thirty or forty-five minute service at other times during the day, on this relatively long (14 miles) ferry route. The clock-like regularity of operations, twisting and sometimes fog and tide-bound narrow channels, heavy overloads at times, the problem of driftwood and need for somewhat high operating speeds, has developed the need of a ferry type almost identical to that of the *Chippewa* and *Kalakala,* peculiarly designed for this run. Roomy passenger cabins with soft seats; large promenade decks for tourists' use in clear weather, and roomy automobile decks to swiftly handle a motley load of vehicles, plus large lavatories, lunchrooms, etc., are all requisites of the route, largely due to the fact that the load must be "good sailors" for almost exactly an hour.

The *Willapa* and *Enetai* are part of the once vast fleet of San Francisco Bay ferries, and were formerly two of the six Diesel-Electric ferries that carried automobiles and passengers between San Francisco and Oakland. The *Willapa* was formerly **the** *Fresno* and the *Enetai* formerly the *Santa Rosa.*

Conversion of these ships from narrow-cabined short-haul automobile ferries, with double end Diesel electric drive, to de luxe type, single end, high speed ships with very large seating capacity in four cabins, including a splendid ladies lounge and observation cabin, with a total capacity for 2,000 people, was accomplished in short time at the plant of the Winslow Marine Railway on Bainbridge Island. James E. Murphy, veteran Vice President in charge of grief for the P.S.N., was in charge, and practically specified duplicate power plants for both conversions to those installed in the *Chippewa* and *Kalakala.* Not a single major change in the layout, including separate scavenging, waste heat boilers, control systems, etc., was needed, even after eight years since the *Chippewa* was changed over, which speaks well for the original Busch-Sulzer design. Only the fuel injection system and blower fan has been changed, or rather modernized.

Each ferry carries a 2,800 hp. 6 cylinder main Diesel and a 450 hp. 6 cylinder 4-cycle auxiliary Diesel to drive the dual electric generating system. They were converted in ninety days and went on the Bremerton-Seattle run in late May and early June, to end their days on the one Western ferry route that will never be abolished by a bridge. Back-tracking for a moment, the Puget Sound Navigation Company has now acquired more than fifteen of the former San Francisco Bay fleet in a series of shrewd transactions engineered by Capt. Alexander M. Peabody. First the fleet of six Golden Gate Diesel-electric, wooden hulled ferries was picked up and all but one successfully towed up the coast to Puget Sound. These ferries, one now being held in reserve as a spare, are thirteen knot, 1,000 passenger, 72 car ships. Next in line are the six steel-hulled ferries built at the Moore and the Bethlehem yards on San Francisco Bay, which had the largest automobile capacity of any ferries built in America at the time they were commissioned. All had propellers, motor driven, fore and aft, and four Diesel-electric generating sets and carried 600 passengers, 85 automobiles on seven roomy lanes and would do 14½ knots.

The *Willapa* and *Enetai* are cleverly modernized versions of the *Chippewa* in interior layout, but of much larger capacity. Their fine steel hulls, built in 1927, are beautiful, easy to drive and can turn "Square Corners" on a dime!! They are each 257 x 66 x 13 ft. draft aft, and 10½ ft. draft forward and are 1023 gross tons. The hulls are divided into seven water tight compartments, with the two middle compartments being used for machinery, day tanks, air bottles, etc., and the compartments next outward from the middle for storage of 20,000 gallons of fuel oil, or enough for 10 days continuous operation.

The repower job increased the shaft horsepower 50% and the speed 2½ knots, besides actually lightening the gross machinery weight. Outstanding feature of the layout is the fact that the power plant is equipped to burn black boiler oil, utilizing a pre-heating, centrifuging and secondary heating system, like that developed at the McMinnville Diesel plant where Busch-Sulzer Diesels were equipped to burn low-grade, low cost fuel several years ago.

Thus, taking the bull by the horns, the Puget Sound Navigation Company will have a fleet of eight fast, modern Diesel ferries whose power plants can burn $1.20 bunker fuel oil instead of $1.80 Diesel fuel oil, or a 33% saving right there. This is the largest Diesel ferry installation in the U.S.A. so equipped, and a vivid, effective answer to the historic charge of steamship operators that Diesels require more costly fuel.

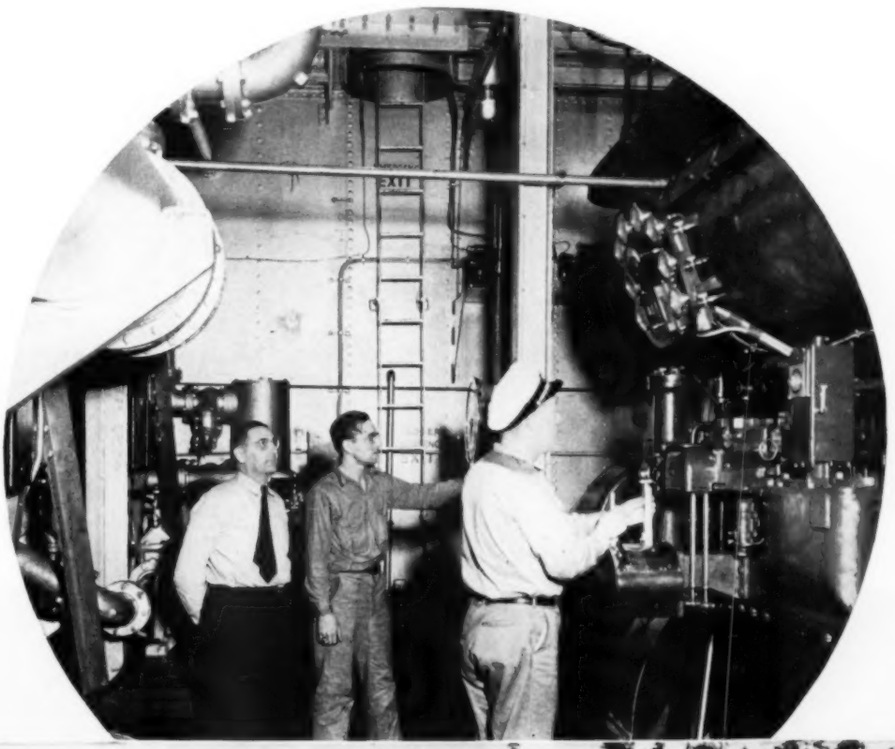
The *Willapa* and *Enetai* are well designed ships, with higher than usual freeboard, low center of gravity (they actually lean *inward* at high speeds with a load, around those sharp corners on the Bremerton route), and lifting the weight on one end, gives them a relatively light draft forward. The original Sperry Electric steering gear was left intact, which is ideal for swift maneuvering. The passenger deck was extended to the full width of the ship to increase seating capacity to 2,000, and a large

square fountain was fitted, as well as newsstand, novel ladies lounge and very large restrooms with the latest in plumbing. The remarkably successful fan-draft air heating system first used on the *Kalakala* was again fitted here, as well as endless plate glass windows all around. The increased width of the passenger cabin permitted a huge, flat upper promenade deck for use in sunny weather. The seven-lane automobile deck was left intact to provide a very large capacity with plenty of room for passengers to walk around.

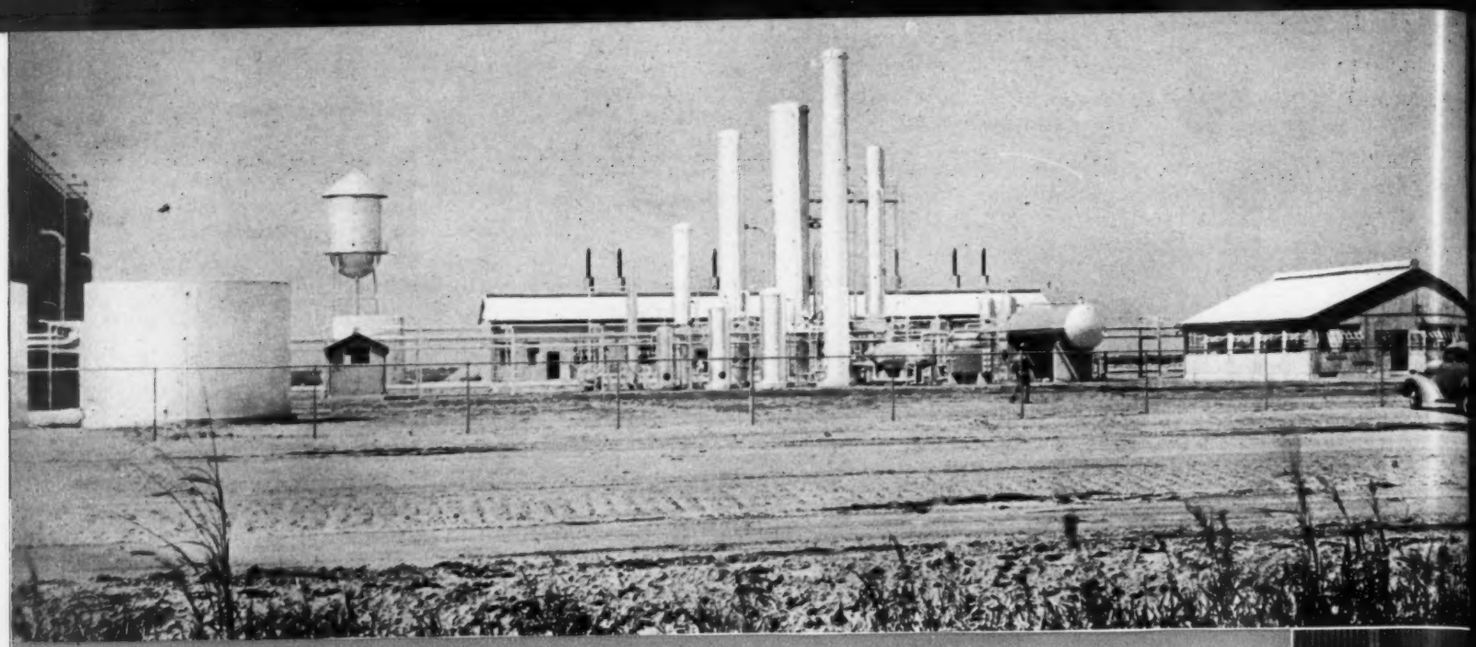
The machinery consists of an 8 cylinder, trunk piston, 2-cycle Busch-Sulzer Diesel, Model 8 DAMT, with cylinders 20½" x 27½", delivering 2,800 hp. at 240 rpm. Each engine is equipped with eight special Aircraft & Diesel Equipment Co.'s Adeco fuel pumps for handling heavy fuel; a 48 outlet Nathan Lubricator, eight Motoco Piston Cooling Water thermometers, Woodward Governor, Alnor Pyrometer, Weston tachometer. Scavenging air is provided by an Elliott Turbine blower and 250 hp. motor, drawing outside air through a carefully dampened intake-silencer. Cooling water, lubricating oil and piston cooling oil is passed through Condenser Service Co.'s heat exchangers. Forward of the bulkhead wall, separating the main and auxiliary engine rooms, is the equally spacious, large auxiliary Diesel generating set. Here a 6 cylinder, 4 cycle, 13" x 17" 360 rpm. Busch-Sulzer Diesel, delivering the rated output of 450 hp. is mounted to the side of the centerline. Directly connected to the shaft is an Elliott 150 kw., 350 rpm. 125 volt D.C. generator. Excitation is provided by a 7½ kw. unit belt driven off the outer end of the shaft. Also mounted on the same shaft is a 480 volt, 3 phase, 60 cycle, 3-2 kva. alternating current generator. The dual current supplied enables the use of either A.C. or D.C. to best advantage. For example, the scavenging blower is A.C. driven as well as lubricating and water circulating and salt water pumps. The D.C. current system supplies the galley, ships lights, Sperry Steering gear and bilge pumps. It was by this ingenious means possible to utilize all older equipment, still usable, and keep the sudden surges of the scavenging blower load entirely away from the ship's "Hotel" load circuits.

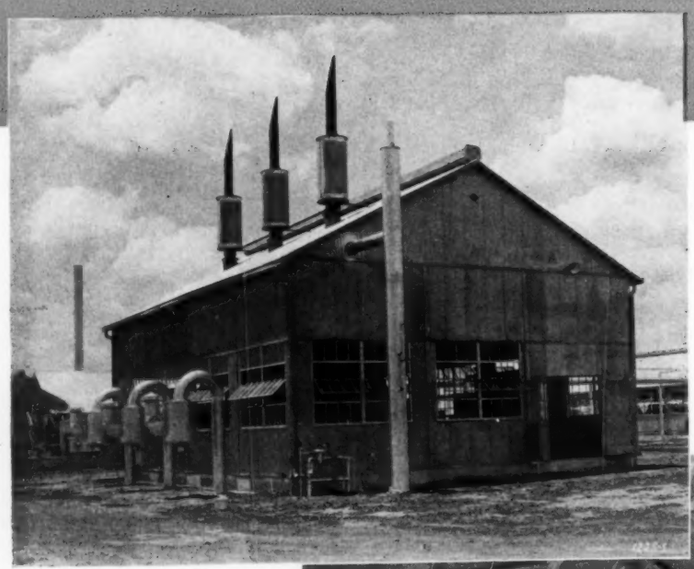
Byron Jackson, De Laval and Quimby pump units are used, as well as Cutler Hammer motor controls throughout. Two Sharples Centrifuges are provided for fuel and lube oil cleaning, as well as a pre-heating heat exchanger for the boiler fuel oil and a jacketed pipe from the day tank direct to the fuel pumps on the main engine. A Trumbull Electric main switchboard is fitted, as well as Rex air compressor, an American Radiator emergency heating boiler. The waste heat boiler and air bottles were supplied by the Acme Boiler Co. of Seattle. A Lux-Rich 31 bottle CO_2 fire extinguishing system is provided for the machinery spaces. A Coolidge 4-bladed manganese bronze propeller is used.

The success of this type of installation in the *Chippewa* and *Kalakala* speaks for itself, and more so because hardly a change was made in the general layout in the new ships. Dock to dock, including backing in at Bremerton, is now regularly accomplished in 58 minutes, largely due to the swift maneuverability and flexibility of the quick-starting, separately scavenged 2-cycle Busch-Sulzer Diesel.



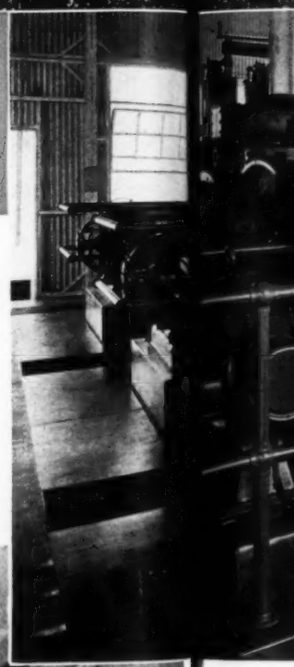
Mr. Neil McCullough, Chief Engineer of the Motor Ferry "Willapa," and one of his assistants watching Guarantee Engineer Ballinger at the operating controls of the 2800 hp. Busch-Sulzer main engine.





General view of the Gulf Plains Recycling plant at Banquete, Texas. Exhausts of the gas engine "Angle" compressor units are seen in the center background; the cooling tower, left; the generating plant, right.

The three Clark, supercharged, Super 2 cycle, "Angle" engines and Westinghouse generators. →



This building houses the three Clark "Angle", 3 cylinder, 375 hp., Super 2 cycle gas engines and direct connected Westinghouse alternators.

The battery of five Clark, 800 hp., 8 cylinder, Super 2 cycle, gas engine "Angle" compressor units in the main plant building of the Gulf Plains Recycling Plant. →

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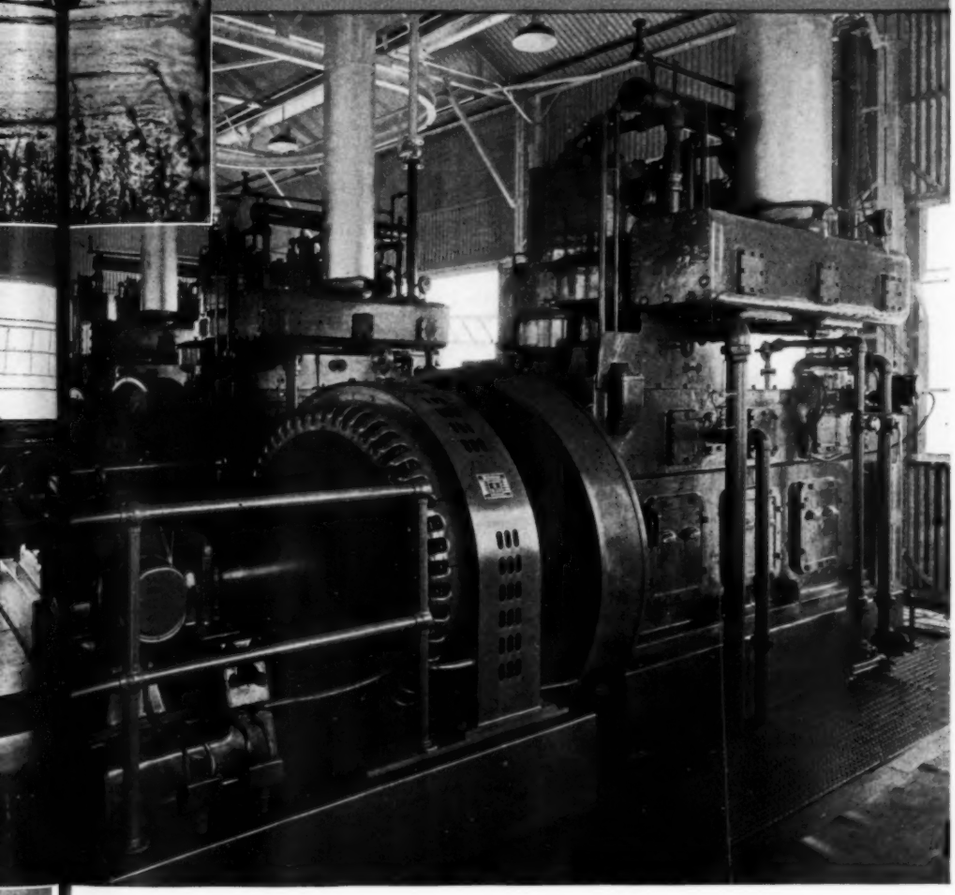
GULF PLAINS RECYCLING PLANT

By DOUGLAS SHEARING



SITUATED between the Agua Dulce and Stratton fields in Nueces County, Texas, the Gulf Plains Corporation's recycling plant represents a new and important addition to the facilities for recovery of condensate and for reservoir pressure in this high pressure area. The plant is designed to handle 100,000,000 cu. ft. of gas per day at an intake pressure up to 1500 lb. per sq. in. gauge and at a discharge pressure as high as 3250 lb. per sq. in.

Wet gas from the intakes is passed through sections in the base of the cooling tower and thence to the high pressure absorbers. Upon leaving the absorbers, the denuded gas is led to the suction intakes of the compressor units for injection into the key wells. The equipment used for returning the dry gas to the producing sands for pressure maintenance consists of five gas engines, each 8 cylinder, 800 hp., Super 2 cycle, driving right angle compressor units. One compressor unit is made up of a 11½" bore, 14" stroke cylinder and three 4⅜" bore, 14" stroke cylinders; two of these units have 3⅝" bore, 14" stroke cylinders and the other two units have 4⅜" bore, 14" stroke cylinders.

The forged steel compressor cylinders, fitted with cast iron liners, are designed to operate at a pressure of 4000 lb. per sq. in. maximum. The cylinders are jacketed for cooling. The five power units, totalling 4000 hp. consist of single row, vertical cylinders of the 2 stroke cycle type, burning gas fuel. Full pressure lubrication is provided for all bearings and valve mechanisms. Lubrication is supplied to the power cylinders, the compressor and scavenging cylinders and to the compressor piston rod packing by mechanical force feed lubricators. Oil bath type air cleaners of 5000 cu. ft. per min. capacity are fitted to each of the compressors.

All of the electrical energy required for pumping, lighting and various services throughout the plant is supplied by three supercharged gas engines, of three cylinders each, 14" bore, 14" stroke, rated 375 bhp. at 360 rpm., direct connected to 312 kva. synchronous generators. An interesting feature of the supercharged, 2-cycle, "Angle" engine is the scavenging air by-pass control which was developed to provide the desired degree of close regulation for generator service and to maintain economical performance throughout the load range of the engine. A by-pass valve automatically controls the flow of scavenging air to the power cylinders to maintain a correct mixture of fuel gas and air for the load range. The by-pass valve is operated by a diaphragm motor which is activated by the variance in pressure of the fuel gas as it is delivered to the injection valves by the governor valve. On each of these engines, the three power cylinders are arranged in the usual vertical position and the scavenging cylinder is horizontal. The scavenging cylinder is double acting and pumps air at about 3¾ lb. per sq. in. pressure into a common manifold located in the upper crankcase. The power cylinders are supplied from this manifold.

Cooling of the supercharged power cylinder is effected by high velocity, forced circulation. A spiral cast in the outer wall of the cylinder forces the cooling water to flow around the cylinder wall. Entering below the exhaust port, the cooling water circulates through the cylinder, then through the spiral chamber at high velocity to the upper flange and thence through the cylinder head.

Low tension magnetos and coils as well as other explosion-proof equipment are installed on all of the Clark engines at the Gulf Plains Recycling Plant.

All prime movers, including the five right angle compressor units and the three "super" 2 cycle generator engines are products of Clark Bros. Co., Inc.; the generators are Westinghouse; fuel and lube oil filters are Purolator; hydraulic governors are Pickering; force feed mechanical lubricators are McCord; crankcase breathers are Air-Maze.

The two unit, 4,000 hp., Diesel-electric locomotive leaving yards at Schenectady for a trial run.

ALCO–G. E. 4,000 Hp. LOCOMOTIVE

CAPABLE of one hundred twenty miles an hour, a 4,000 hp. Diesel-electric locomotive, designed and built jointly by the American Locomotive and General Electric Companies was recently delivered to the Santa Fe Railroad. It will haul the Santa Fe's crack "Super Chief"—a nine car de luxe passenger train—from Chicago to Los Angeles over a route which reaches an elevation of 7,600 feet and encounters grades of 3.7 per cent. While this two unit locomotive is capable of 120 miles per hour, the schedule on this 39¾ hour run to the West Coast limits top speed to 81 miles per hour. This is an important addition to the Diesel motive power of the Santa Fe, already the largest user of Diesel-electric locomotives among the railroads of the United States.

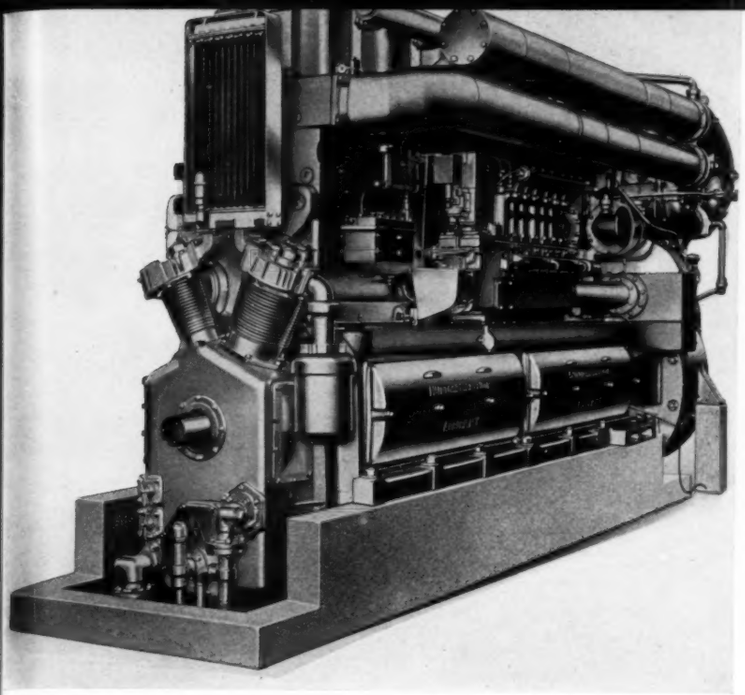
Each of the two locomotive units is powered with two Alco four cycle, six cylinder, 12½" bore, 13" stroke Diesel engines developing 1,000 bhp. at 740 rpm. with Buchi turbo superchargers. To meet the somewhat higher than normal load factor of engines in road service, as compared with switcher service and the like, these engines are fitted with modified cylinder heads which embody larger valves and larger port areas. Another departure in these engines from previous design are the built-in two stage air compressors for brake service. The Westinghouse Air Brake Company collaborated in developing this two cylinder compressor which is attached to the end of the engine and driven by an extension bolted to the main crankshaft.

The compressor intercooler is mounted just above the compressor. Another interesting feature is the fitting of the engine lube oil circulating pump within the compressor crankcase with drive from the extension shaft.

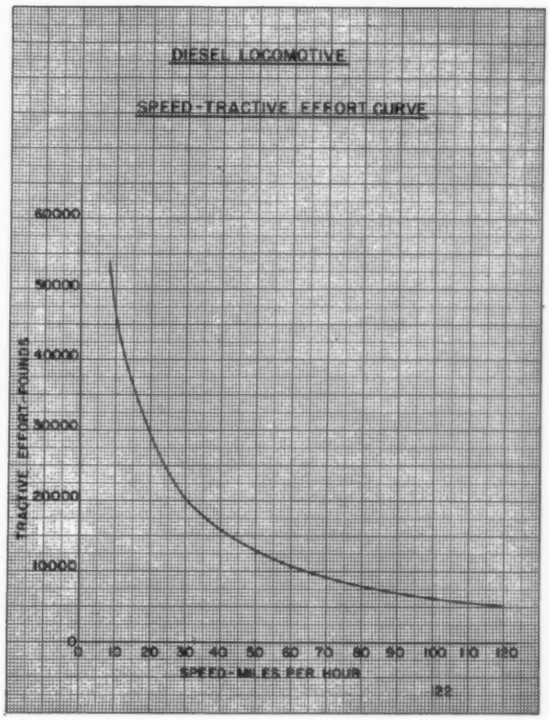
Features which characterize these Alco Diesel engines are two exhaust valves and two intake valves in each cylinder head; totally enclosed valve gear; seven bearing crankshaft; aluminum alloy pistons with cast iron rings; individual fuel injection pumps; full pressure lubrication with a low pressure trip in the system; Woodward hydraulic, variable speed governor with independent overspeed safety trip; independent water and lube oil systems for each engine.

Electrical equipment for this locomotive is all General Electric and consists of a main generator of 1,700 amps. continuous rating, direct connected to each Diesel, an auxiliary generator of 150 amps. continuous rating, driven through the main generator shaft extension, and an exciter mounted on top of the auxiliary generator. The main generators have sufficient capacity to absorb the entire output of the engine and as an added protective measure, a speed switch is fitted to the exciter shaft which keeps the engine fully loaded under all conditions. The two main generators in each locomotive unit supply current to four single-geared traction motors. The auxiliary generators supply power to the control and lighting circuits, all electrically operated auxiliaries and for charging the 32 cell Exide battery. The four traction motors, each having a continuous rating of 700 amps., develop a continuous tractive effort totaling 17,300 lbs.

The traction motor reverser, line contactors and throttle mechanisms are electro-pneumatically operated. The remaining contactors are operated magnetically. Power supplied by the engines is regulated in eight steps by the controller handle at the engineer's position. The traction motor, two of which are connected to each power plant, are arranged to operate in series and parallel. In the latter connection they are also operated with shunted fields. The

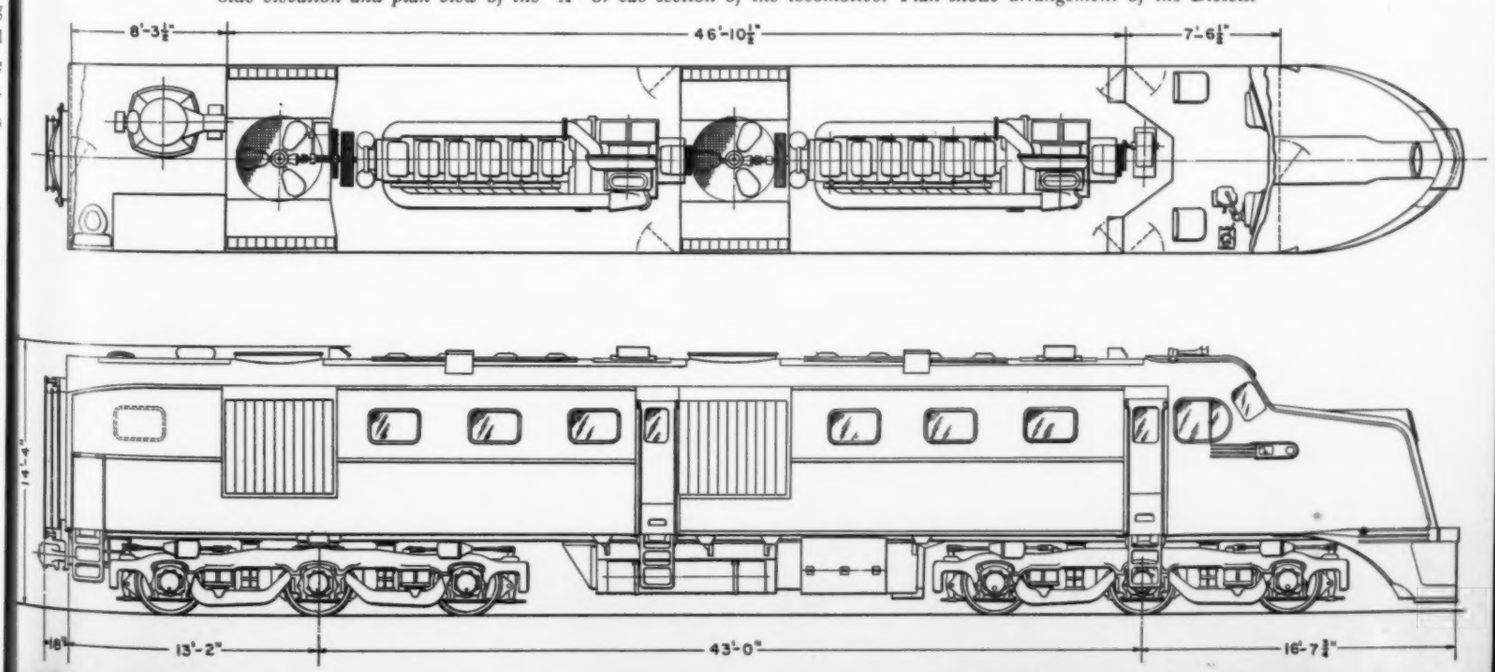


Shop view of the Alco, six cylinder Diesel, four of which power this 120 mph. locomotive. Seen upper right is the Buchi turbo supercharger; center, the Woodward variable speed hydraulic governor; and, left, the two stage built-in air compressor with its intercooler.



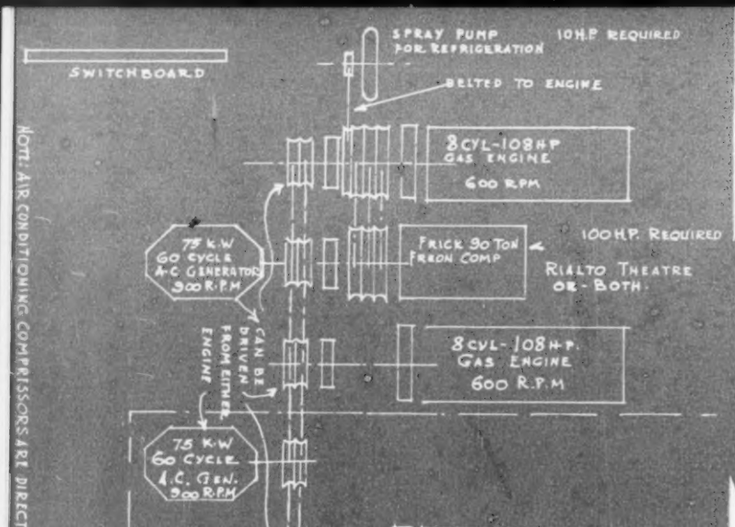
motor connections, on each power plant individually, are changed automatically from series to parallel, and from parallel full field to parallel shunt field. These connections are controlled by relays whereby transfers are obtained not only at rated engine speed but over the entire range of engine speeds. These same relays also drop out the field shunting contactors if the locomotive speed is reduced below the predetermined range for shunt operation. Direction of movement is controlled by a small reverse handle in the master controller. This has three positions: forward, off, and reverse. It is thrown to forward or reverse position before starting, and the locomotive is then controlled by operating the main controller handle. Transfers to parallel and shunt field are entirely automatic. Wheel slipping relays operate a light to warn the engineer of wheel slipping during series operation, and to prevent transferring to parallel while this condition exists. These lights also flash momentarily during transfer to parallel indicating when this takes place on each power plant.

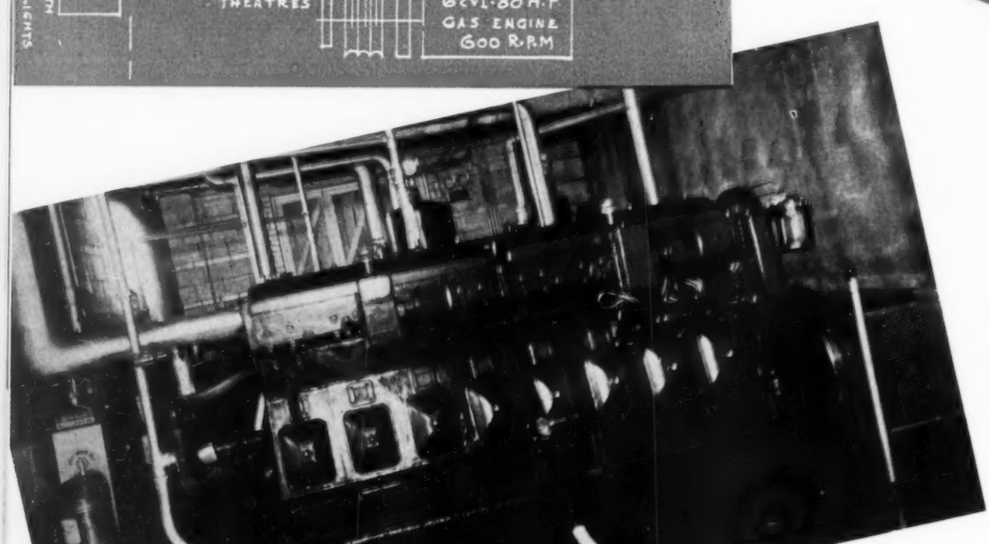
Side elevation and plan view of the "A" or cab section of the locomotive. Plan shows arrangement of the Diesels.



INTERSTATE THEATRES, INC.

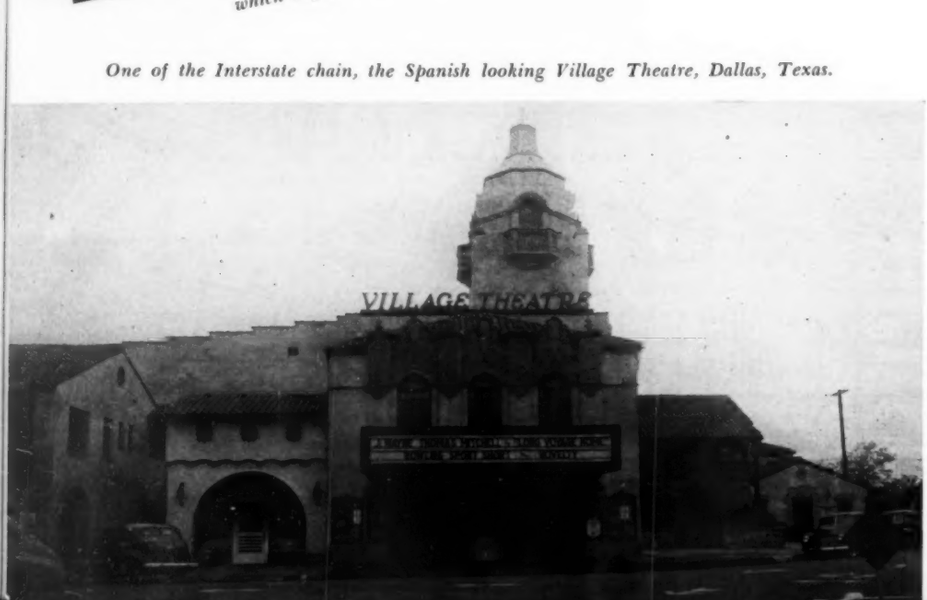
By ORVILLE ADAMS





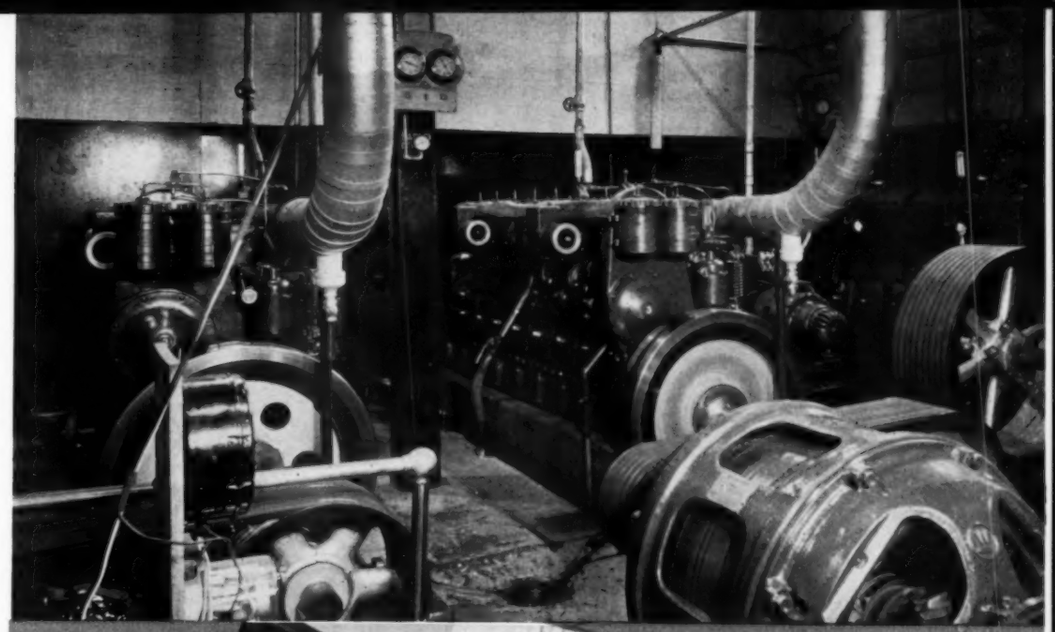
Seen here is one of the two National Transit gas engines, each rated 120 hp., which supplies power for lights and air conditioning in the Village Theatre.

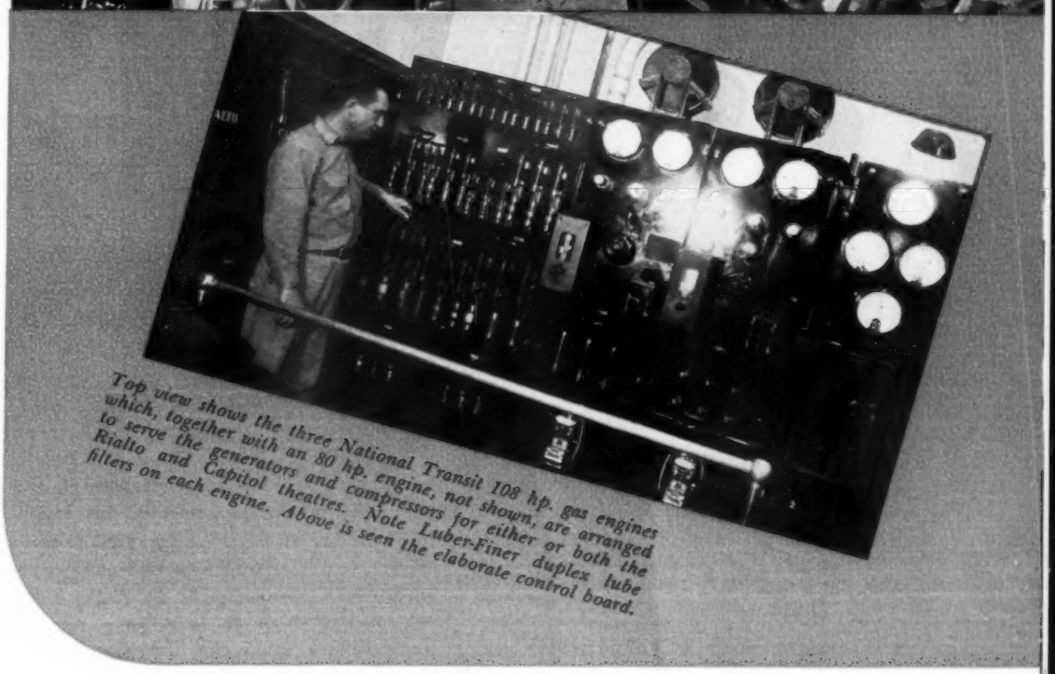
One of the Interstate chain, the Spanish looking Village Theatre, Dallas, Texas.



THREE large theatres in Dallas, Texas, the Rialto, the Capitol, and the Village, have their own power plants. These theatres are owned and operated by the Interstate Circuit, Inc., which controls one of the largest groups of theatres in the Southwest. Several years ago, this organization looked into the possibilities of individual power plants for theatres. Increased amounts of power were required to operate the modern theatre with the coming of air-conditioning, and the ever-increasing use of lighting, and rates for purchased power for this type of business were considered high enough to justify investment in power generating equipment. The availability of low cost fuel oil and natural gas in this region indicated the internal combustion engine as the first choice.

The first theatre to have its own power plant was the Rialto, one of the oldest and leading houses in the city. The capacity of this house is more than 1300 seats, and it operates around 18 hours a day. Adjacent to the Rialto is the Capitol, of equal size and operating schedule. These houses, located side by side, could make use of a single power plant and, accordingly, such a plant was designed and installed in the basement just back of the stage of the Rialto. This plant is comprised of four engines, two generators, two air conditioning refrigerating compressors with the air-washing and cooling equipment, condensers, etc. The Village is a new theatre, and one of the largest suburban houses. A similar power plant and cooling system for this house has proved to be a very satisfactory and economical operation.





Top view shows the three National Transit 108 hp. gas engines which, together with an 80 hp. engine, not shown, are arranged to serve the generators and compressors for either or both the Rialto and Capitol theatres. Note Luber-Finer duplex lube filters on each engine. Above is seen the elaborate control board.

The Rialto generating plant consists of four National Transit gas burning engines. Three of these engines are rated at 108 hp. at 600 rpm., and 120 hp. at 700 rpm. These are 8-cylinder, 6″ x 9″ engines operating compressors and generators. The fourth engine is a 6 cylinder, 80 hp. engine of the same bore and stroke and speed. The three large engines are arranged to drive either compressors or generators as desired. The drives are V-belts, and the compressor and generators have drives arranged to alternate with either engine, so that two generators and one compressor may be operating at one time. The smaller engine is V-belted to the other compressor to handle standby and peak loads on the cooling system. This driving layout has proved to be flexible and it affords the greatest reliability.

The generators are each rated at 93 kva. and .8 pf. and have direct connected exciters. They are operated at 900 rpm. and current is generated at 240 volts AC. The average electrical load is approximately 60 kw. for the daylight hours and 80 kw. for the night hours. A considerable electrical load is required during the summer months for driving fans, motors for pumping equipment, and the various electrical equipment in the projection room.

The air-conditioning system requires two compressors, a 93 ton machine and a 65 ton machine. These York machines use freon and are considered highly efficient for this type of service. The average refrigeration load is amply handled by the 93 ton machine, while the smaller compressor is used for low loads, standby, and peak load operation as theatre occupancy conditions may require.

Another feature of this installation is the emergency lighting-generating set, comprising a 15 hp. Hercules engine directly connected to a 7½ kw. generator. This unit operates only about four hours a day and in emergencies. It is used in the early morning hours before the main units are started up at 8:30 A.M. or at night after the plant is shut down, if needed for any reason. This small unit generates economical current for lighting, and is a satisfactory unit for this purpose.

The switchboard and instruments are modern with ample control devices, voltage regulators, and recording instruments. A special feature of this board is its voltage regulator, designed to give the most accurate and reliable regulation to serve the delicate sound apparatus and projection machine operating requirements. The Village theatre plant is quite similar, using the same type and size of engines, generators and compressors. There is one 8 cylinder engine and one 6 cylinder engine, and an emergency generating set for lighting, which operates in the morning before the large engines start up for the opening of the show. One engine in this plant handles the average load.

The Rialto plant handles both the Rialto and the Capitol theatres, and hence is a high load factor plant. During peak operation in the hot months, the plant is loaded to capacity with the exception of the smaller engine and compressor. The log sheet for a typical day in August shows that the plant is started shortly after 8 A.M. with one engine and generator. Soon thereafter, a second engine generator unit is started, and then the engine and compressor unit is started up about one half hour before the show opens at 10 A.M. The load on the compressor unit depends upon the requirements for cooling, and the temperature. It is indicated, however, that the cooling load is practically constant throughout the day, while the power and lighting load varies from the day time load to the night peak when all lights are in use.

The log sheet reveals some interesting features of this type of operation. In addition to the engine data, comprising water temperatures on the cooling system and the oil pressure readings, the log provides for hourly recording of the compressor pressures, the condenser water temperatures, as well as outside wet and dry bulb temperatures. A close watch over inside temperatures and hourly recording is carried out, as well as an hourly check on the seating capacity of both houses occupied. This sort of record reflects true operating data and gives

The Capitol and Rialto theatres, when operating simultaneously, require the full power output of the four gas engines described in this article. Through interchangeable drives either theatre may be operated separately on any combination of two engines.

a picture of the exact distribution of the power generated. A most satisfactory service results.

The engines are operated on natural gas fuel, which is available at a fair price. The engines are equipped with dual ignition, which affords more reliable ignition as well as better combustion efficiency.

The cooling water circulating pumps are engine driven from the engine crankshaft by means of a belt. The water is circulated through a closed cooling system. Make-up is supplied from a soft water supply conditioned by a Zeolite water softening system. There are air cleaners on each section of the engine manifold, and the air is taken into the engines from the engine room. This helps to reduce the engine heat, and since the engine room is provided with a good ventilating system, this method works out satisfactorily.

The engine foundations are cork insulated, and the operation is unusually quiet. The exhaust pipes running from the exhaust manifold to the outlet stack are heat insulated. The exhaust is discharged into a common silencer and stack that leads straight up through the building to the roof. With the plant in full operation and the back door of the engine room opening on the street, the sound of operation is scarcely noticeable by those passing the open door. Conversation in the engine room may be carried on in an ordinary tone of voice without appreciable difficulty, a very interesting feature of this installation.

Two operators run the plant in two shifts, and the operation is under a union contract. Not only a good job of technical operation is accomplished, but a very attractive housekeeping job is evident because each operator strives to outdo the other on his shift.

The modern theatre is a complex technical and engineering project, and requires good engineering and technical treatment. The power and lighting load is constantly increasing with the demand for more comfort, greater lighting effects, and other operating features. The power question and problems of power supply as well as reliability is a vital question. Blackouts in a theatre are no longer tolerable. Hence, the modern theatre becomes an interesting application for Diesel and gas engine power. This installation is typical in most respects of the general requirement of theatre installation. A long range view favors the increasing application of internal combustion engines for theatre power and lighting.

The switchboard is fitted with the necessary control apparatus and power distribution for both theatres. Recording watthour meters are used to check the production. An automatic gas engine driven generator of 7½ kw. is controlled by a magnetic switch and operates when the main plant is shut down. This plant is used for cleaning up purposes and for any night or morning work in the offices, booths, and the like. Normally during the day only one engine is running to produce electric energy for both theatres, and one compressor is sufficient except in the hottest weather.

The total cost of the plant, after deducting the belts, drives and motor costs for the air conditioning system, which would be chargeable if the air conditioning were driven with purchased power, was $16,850.00, which covers the engines, generators, switchboard and the installation costs.

According to Mr. E. C. Zrenner, the Interstate's engineer in charge of air conditioning, the production cost in this plant shown by a survey he made is .00422 cents per kw. hr., which does not include plant depreciation. It is stated that theatres in large cities pay on a yearly basis anywhere from 1½ to 2 cents per kw. hr., while the cost for smaller theatres ranges from 2 to 5 cents per kw. hr. The costs in this plant were broken down as follows:

Fuel (Natural Gas)	.00375
Maintenance	.00023
Lube Oil	.00024
Total	.00422

Added to this cost, naturally, is depreciation, which in this case is on a ten year basis, but even with this depreciation added the total costs on a yearly basis would not exceed .009 to .012, depending upon variable factors, such as fuel costs. There has been widespread interest in this plant since its installation. Many other theatres in this system are using gas engine power for driving the air conditioning compressors, even the smaller houses in outlying towns.

Equipment common to all engines in these plants are: Air-Maze intake air cleaners, Pickering governors, Curtiss starting air compressors, Luber-Finer lube oil filters, and Cities Service DC-4 lube oil. The switchboard and instruments are Westinghouse.

View of the Atlas Diesel Dredge Tender "Gareco" towing her own deck cradle.

"GARECO" GOES SOUTH

ORDINARILY, dredge tenders receive little if any notice as they perform their humdrum but vitally essential duties. These little "one-man" Diesel tugs that shift pontoons and barges and otherwise serve harbor or channel dredges are usually taken for granted despite their important contributions to maritime commerce. National defense requirements in the form of a U. S. Navy dredging contract at the Panama Canal Zone, however, recently threw the spotlight of public attention on this type vessel. Like everything else, a dredge tender receives most attention when it is needed some place and isn't there. Our Navy's answer to that problem is to get it there and quickly. Thus it was that the *Gareco* was picked out of the water in New York, just as she came off a job, hoisted to the deck of the modern express liner *Panama,* and was ready for work a week later at Cristobal as soon as she hit the water again. As the importance of improved harbor facilities looms larger and larger in view of events abroad, even the lowly dredge tender must be recognized as a defense link to maintain battle fleet effectiveness. It also typifies one of the most effective applications of marine Diesel engines.

Gareco is one of five Atlas Imperial Diesel-powered tenders owned by the Gahagan Construction Corporation of Brooklyn, New York, and the second to be assigned to their seagoing dredge *Peru,* now engaged in harbor dredging for the Navy at the Canal Zone. The dredging activities of this well-known company during the past twelve years have been wide spread and the *Peru* has been constantly active in Peru, Colombia, Venezuela, Porto Rico, on the Gulf of Mexico, the Atlantic seaboard and the Great Lakes. Naturally, where the dredge goes the tenders must follow.

When it was decided to send *Gareco* to Cristobal, she was at Charleston, S. C., and proceeded to New York via the Inland Waterway, arriving only thirty-six hours ahead of sailing time due to heavy weather. A timber cradle was hastily constructed at Sullivan's Yard in Brooklyn and towed to Pier 64 by *Gareco.* There a Merritt-Chapman & Scott floating crane lifted first the cradle and then the 40 ton tug onto the *Panama's* No. 6 hatch, just aft of the swimming pool. The entire loading procedure required less than forty-five minutes.

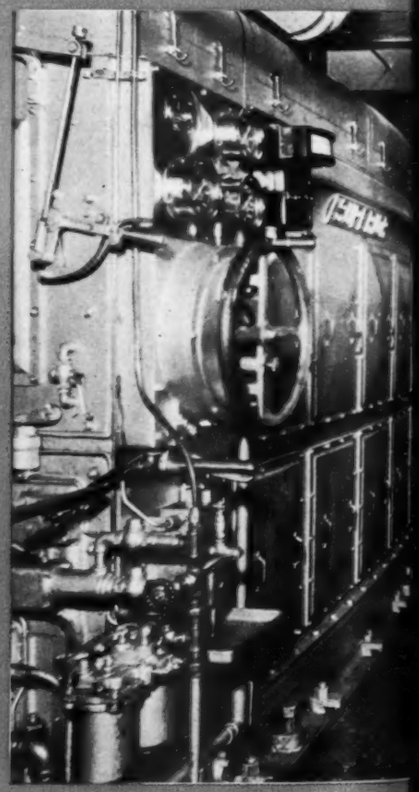
Gareco measures 47.7′ x 11.7′ x 5.3′ at the waterline and is powered by a 6 cylinder, 120 hp., direct-reversible Atlas Imperial Diesel which turns a Columbian propeller at 400 rpm. Complete pilot house control is conveniently located at the wheel and gives the "one-man operation" so essential to this type of service. As mentioned previously, dredge tending provides full utilization of marine Diesel characteristics. Immediate availability from a cold start eliminates fuel waste during standby periods which occur frequently in this intermittent service. Fuel economy provides both minimum operating cost and minimum time off active duty for re-fueling.

Gareco's "luxury cruise" on the *Panama* is interesting news but it has even greater significance: American industry's ability to get jobs done quickly and economically.

The "Gareco" is lifted aboard the "S.S. Panama" for shipment to the Panama Canal Zone.

DIESEL BOATS FOR PANAMA

By WARREN GLEASON



WITH the furthering of all aspects of National Defense, more and more Diesel installations are finding their way into the service of the country. An unusual flotilla recently left the port of New Orleans for the neighborhood of Panama. All the units involved were constructed in shipyards in or near New Orleans and every unit was Diesel-propelled.

Heading the parade was the brand new all-steel tug *Colonel Ernest H. Agnew*, built by the Equitable Equipment Company, Inc., of New Orleans, for the U. S. Quartermaster Corps and powered by a Superior Diesel. The initial task for this fine Army tug was the towing of four 120-foot tank barges to Panama, each barge Diesel-equipped for handling gasoline cargo. And atop one of these barges was perched the new Diesel tug *Davis*, also for the Quartermaster Corps, designed and built by the Allen Boat Company of Algiers, Louisiana.

The contract for loading the *Davis* aboard its barge, assembling the tow and delivering the whole outfit to the canal zone was also undertaken by the Allen Boat Company. The *Davis* was lifted from the water by derrick and secured in place with never a mishap. The trip was consummated with great success and, according to unofficial reports, inside of two hours after the arrival of the flotilla, the *Davis* was in the water again and ready for work. Quoting one government inspector—"Jack Allen had that tug so well loaded and made fast that the barge could have rolled clear over a couple of times without the *Davis* budging an inch!"

This compliment will be all the better appreciated by mentioning that the *Davis* is a sizeable tugboat: 60′ overall, with a beam of 16′ and a 6′ draft. Her power is a Washington Diesel, of 180 hp. at 400 rpm. and her accessory equipment is in proportion. The successful transporting by barge over such a distance, of this heavy all-steel arc-welded tug, demonstrates decided capability on the part of the contractor.

The four barges in the tow, also of all-steel arc-welded construction and all for the Quartermaster Corps, are identical in all respects. All of them built by Equitable Equipment Company, they are 120′ in length, 33′ in width and of a 10′ depth. The tanks of each barge will hold 220,000 gallons of gasoline and are fitted with Morrison vacuum pressure relief valves. There is no propulsion mechanism, but the engine room on the after deck of each houses a Buda Diesel of six cylinders, developing 50 hp. at 900 rpm. Starting is electric, using Exide batteries. Penflex tubing carries the exhaust to Maxim silencers. Each Buda Diesel is direct connected to a Viking 8″ cargo pump, which delivers 1,000 gallons per minute.

The tug *Colonel Ernest H. Agnew* is the first of four identical tugs to be built by Equitable for the Quartermaster Corps; the second of the series, *Brigadier General John B. Bellinger*, has just completed her trial runs. The tug dimensions are 82′ overall, 75′ between perpendiculars. Moulded beam is 23′ with a 9′-6″ depth of hold. Forward draft is 6′-6″, and aft 8′-6″. The *Agnew* is classed A-1 for coastal navigation by the American Bureau of Shipping and also approved by the Department of Commerce, Bureau of Navigation. Inspection of rat-proofing was made by the Public Health Service. The glossy mahogany panelling of the pilot-house and the heart red cypress ceiling of the staterooms or cabins would adorn a luxury liner. The galley sports a floor of 6″ red tiles and a mess-table in natural white oak. Accommodations are provided for ten, includ-

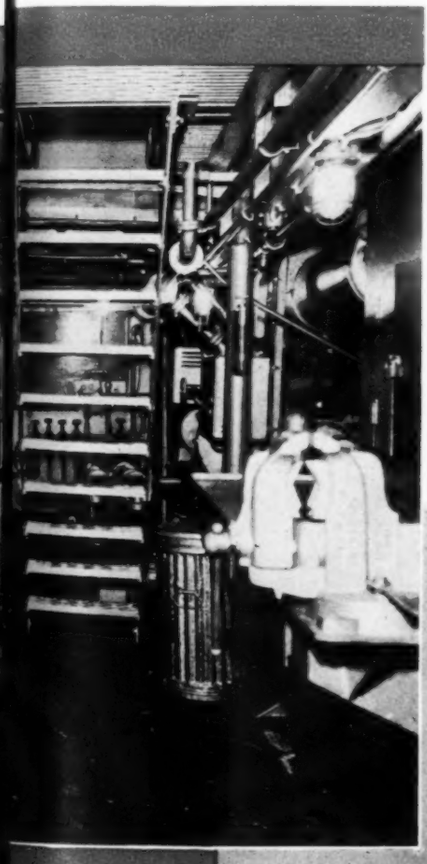
ing officers and seamen. Each cabin has its own lavatory with hot and cold water; all are fitted with overhead and berth-lights. All doors, windows and portlights are bronze-screened; pilot-house windows are auto-lift in bronze sash. Anyone who thinks that a Navy boat represents the utmost in meticulous marine construction ought to take a good look at an Army boat before definitely committing himself.

Power for the *Agnew,* as for the other tugs of the series, is a Superior Diesel, of eight cylinders 12½" by 15", air-starting, direct reversing, and developing 560 hp. at 400 rpm.

Accessories such as air-compressors, pumps for fuel transfer, heat exchanger service, potable fresh water, sanitation water and the like are all driven by individual electric motors. Current for these machines is provided by a dual installation of Superior auxiliary Diesels of 4½" bore by 5¾" stroke, direct connected to 25 kw. Crocker-Wheeler generators. These auxiliary Diesels are electric starting, using Exide 30 v. batteries. Beside powering the accessory machinery, the Diesels also charge the 125 v. Exide batteries for the ship's lighting, refrigeration, and various services.

Every feasible precaution has been taken to guarantee consistent dependable service from the tug. Beside duplication in the auxiliary system, the operation of the main engine has received careful attention. Conveniently placed for the engineer's eye are the lube, fuel and starting air gauges, the Alnor multi-point horizontal edgewise pyrometer giving instant readings of the working temperatures of each cylinder through the eight thermocouples, an overhead instrument board carries five big air gauges, one for each of the four compressed air tanks and one for the whistle and the air-ram for the stern-tube pressure lubricator. The lubricator for the Guthans stern bearing, direct driven from the forward end, of the main engine, is readily visible. In addition to the air-whistle signal system from the pilot-house, a speaking tube is within reach.

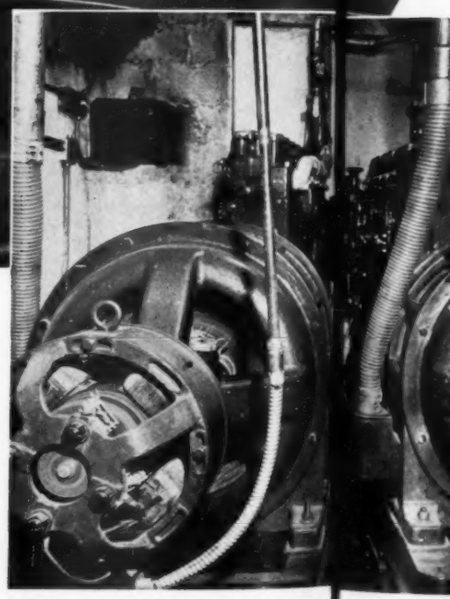
The big Superior Diesel is well protected. The Purolator fuel filter is additionally fitted with a basket strainer to catch any sizeable impurities before they reach the filtering unit; a Nugent pressure filter protects the lube oil; the starting-air supply line is fitted with a DriAir water and trash trap to keep dirt from the cylinders. Beside the built-in pumps on the main Diesel for the cooling water system, there are auxiliary centrifugal pumps driven by a 5 hp. electric motor for fresh water and one of 7½ hp. for raw water which is filtered through sea-chest traps and strainers. The Superior main and auxiliary Diesels were furnished and installation supervised by the Mechanical Equipment Company, Superior distributors for the New Orleans area.



Left: Port side view of the Superior Diesel powering the tug "Colonel Ernest H. Agnew." Note Alnor edgewise pyrometer and Nugent filters. Lower left: One of the Army barges on which Buda Diesels power the cargo pumps.

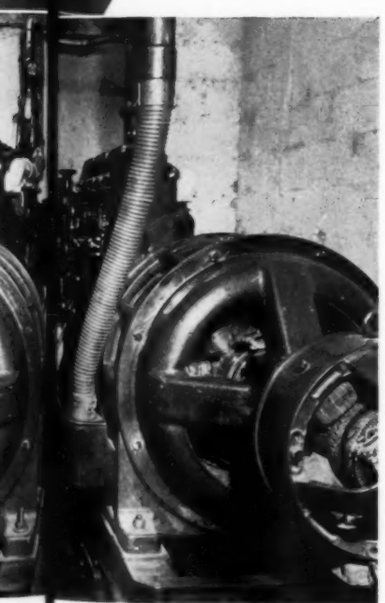
CORAL GABLES' SUPER MARKET SAVES WITH DIESEL

By WILLIAM H. GOTTLIEB



THE consolidation of food retailing units is making it possible for many stores to generate their own power at considerable savings. The small neighborhood grocer with a single refrigerator and relatively few lights seldom felt justified in purchasing his own power plant, but today we find huge food "department stores" with scores of bright lights and sizable refrigeration loads. The large interiors of these stores require lighting day and night, and the trend toward self-service has put a premium on brilliant lighting. It is literally true today that foods sell themselves and attractive, easily-seen displays are the first essential. With this increased demand for electric power and light, it is natural that retailers should find it profitable to install Diesel-generator sets and produce their own power. The Coral Gables Grocery at Coral Gables, Florida, gives eloquent testimony of the possibilities of savings in this field through use of Diesel engines. The multiple departments of this establishment are announced by a row of neon signs across the front of the building. This "grocery" includes a drug store, restaurant, fountain, a shop selling toys, gifts and household wares, a butcher shop, a fruit and vegetable market, a bakery, and also a grocery. Supplying all the electric requirements of the store is a pair of 85 hp. Cummins Diesels in a compact engine room at the rear of the building. R. E. Schneider, proprietor, is too experienced a retailer to skimp on light. Just as the large neon signs brighten up the exterior, seventy-five 250-watt lamps light up the store interior. The butcher, restaurant and fountain naturally all need refrigerators, and the grocery itself features a complete line of frozen foods. In all, there are seven compressors in

Left: Coral Gables "Grocery" is in reality a huge department store selling a wide variety of products. Below: The pair of Cummins Diesel generating sets which brilliantly light this store, and carry the refrigeration and motor loads.



the store. There is no need to detail all the miscellaneous motors in use. Suffice it to say that the average load during the fourteen-hour day comes to 40 kilowatts. Obviously the load does not cease when the store closes. Refrigerators must operate twenty-four hours a day. The neon signs are on at night, making up to some degree for the drop in interior lighting. It is estimated that the total consumption amounts to 5500 kilowatt-hours a week.

It has been the practice of the utility serving Coral Gables, as with so many other utilities, to charge high rates to commercial consumers. When Mr. Schneider opened his original store in 1934, he was offered a rate of 5 cents per kilowatt-hour. Rather than pay that heavy charge, he installed two 15-kw. Cummins Diesel-generator sets. Within two years, the store had outgrown its power plant, and the first pair of engines were traded in for units twice the size. It took just two more years for the fast-expanding store to exceed the capacity of the second plant and, in 1938, Coral Gables Grocery installed the two 85-hp. Cummins Diesels now in service. These engines are operated alternately, each working a twenty-four-hour shift. With the second unit always ready for emergency duty, there is no need for any utility standby service.

The important question is: how much does it cost Coral Gables Grocery to generate 5500 kwh. each week? For this volume of production, the engines consume 425 gallons of fuel oil at a cost of 7.5 cents per gallon. (The cost of fuel in this territory is somewhat higher than average.) The operators are more than generous with lubricating oil, draining the crankcase and discarding the dirty oil once a week. Total consumption of lube oil is six gallons and one quart at a cost of 37 cents a gallon. There is no labor cost charged as such, for the operation of the engines is largely automatic and one of the boys employed in the grocery looks in on the engines occasionally, when he finds the time. There have been no repairs necessary.

The full cost of generating 5500 kwh. boils down, then, to the cost of fuel and lubricating oil, a total of $34.19. This represents a cost of 6.5 mills per kilowatt-hour. After the installation of the Diesels, the power company offered concessions in its rate schedules, but the grocery already had evidence that its own power plant could undercut the utility offer. Figuring purchased power rates at only 3 cents per kwh., the savings through use of the Diesels come to $130 a week, a sum sufficient to pay off the entire cost of the power plant in less than two years. After this short period, the plant is clear of all interest and depreciation charges and pays the $130 a week in savings directly into the cash box.

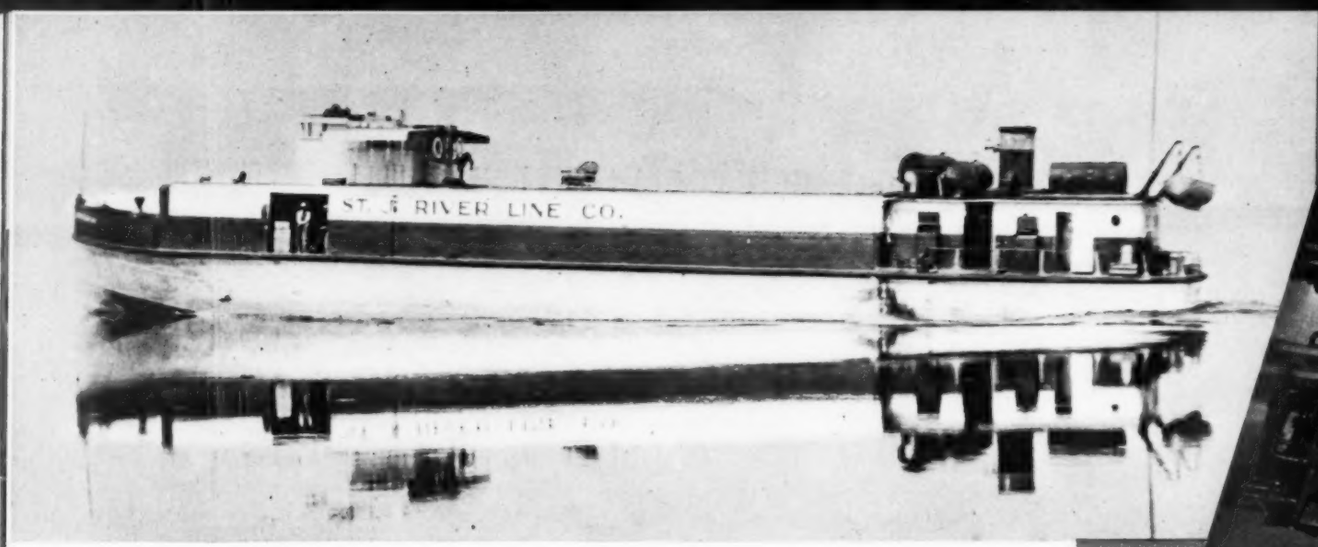
Let us look at the setup of the plant that has achieved this record of economy. Each engine is connected to a 75-kw., 3-phase, 4 wire General Electric alternator with direct-connected exciter. The 75 kw. generators were chosen because the single phase load is high and large generators take the bumps better. The 6-cylinder Cummins Diesels, with 4⅞-in. bore and 6-in. stroke, operate at 1200 rpm. Fuel is stored in a 1000 gal. tank from which it is drawn by an engine-driven gear pump. All six cylinders are supplied by a single pump with a metering plunger which sends measured charges of fuel under 50 to 60 pound pressure through a distributor disc to the injector for each cylinder in the firing order.

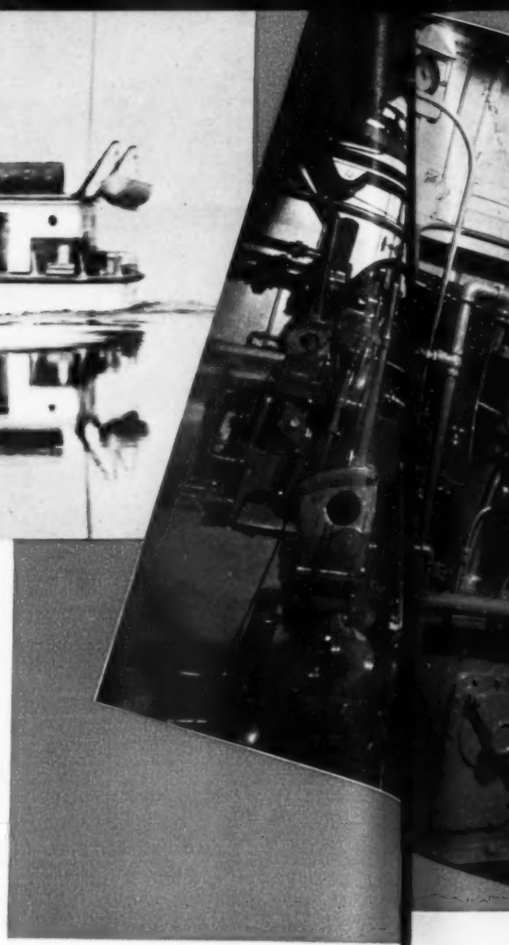
Cooling water is pumped by automatic motor-driven pumps (a Gardner-Denver and a Westco, driven by Century motors) from two 60-ft. wells. The pumps are so adjusted that one works on a pressure range of 8 lbs. to 15 lbs., the other on a range of 5 lbs. to 13 lbs. Thus, both pumps may be turned on with only one actually pumping. The pump with the higher pressure range does most of the work, but if it fails and pressure drops to 5 lbs., the second pump cuts in.

The water is pumped into a pressure storage tank, then goes through the jackets of an ammonia compressor to a mixing tank that serves the Diesels. This tank is merely a stand pipe with a continuous stream of comparatively cold water flowing into it from the compressor jacket. The overflow from the tank runs into a dry well. The engines' own centrifugal pumps take water from the stand pipe, circulate it through the engine jackets and then return the water to the stand pipe. The constant addition of cool water and overflow of hot water keeps the tank at the desired temperature.

Ease and safety of operation were prime requisites in this installation. Engines are easily started with a Leece-Neville electric starter. Four Yocam storage batteries supply the power and these are kept charged with a Yalley Electric charger. The engines are equipped with Penn automatic switches on water temperature and lube oil pressure. These are connected through a double-throw switch so that, if water temperature rises above 195 degrees F. or oil pressure drops below 20 lbs. during the hours the store is open, a horn will sound, summoning the attendant. At night, when the store is closed, the switch is placed in the opposite position and, instead of sounding the horn if water gets too hot or lubricating oil pressure goes too low, the Penn switches work through a solenoid coil, cutting off the fuel supply and shutting down the engines before they suffer damage. Combustion air for the engines is drawn from the engine room through Donaldson oil bath filters mounted on the engine frame.

Thus far, the Diesel plant has operated steadily with exceedingly little attention and has produced power at exceedingly low cost.





Above and on opposite page are shown two of the St. Johns River Line Diesel boats and one of its Diesel tractor and trailer units. Right, the two General Motors Diesels of the Winton type on the "Orlando."

ST. JOHNS RIVER LINE

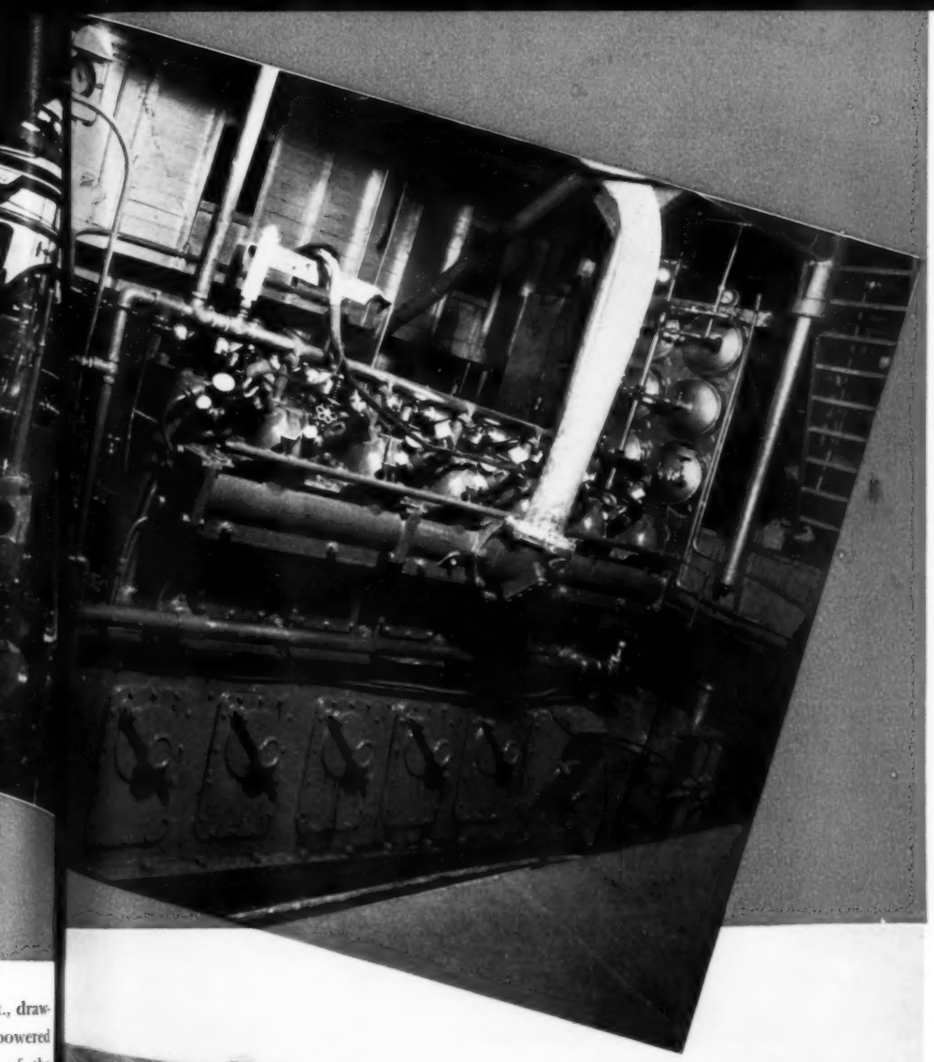
By W. H. GOTTLIEB

BOATS plying the inland waterways on schedule with cargoes of mixed freight are to the average man a relic of decades long past, but there are in the nation some hardy survivals. "Last of the Mohicans" in the Southeast is the St. Johns River Line which carries mixed and heavy freight between Brunswick, Georgia, and Jacksonville, Florida, and also serves a dozen cities on the only river in the United States that flows north. Let us make it clear that this is no story of ancient ships groaning along in a mist of past glories. The St. Johns River Line is thoroughly modern in method and equipment, carrying more than 100,000 tons of freight each year on a fleet of boats and trucks. Much of its success can be attributed to intelligent use of efficient machinery, and it is no surprise to find that all the boats and many of the trucks are powered by Diesel engines.

The company started in 1920 as a small truck operator and, as business volume increased, the trucks were put on a regular schedule, connecting with boats of the Clyde Line. During Florida's boom years, business overtaxed Clyde's capacity and G. F. Tresher, founder and president of the company, bought a 65-ft. boat to handle some of the trade that could be had for the asking. By 1929, the boom had collapsed and the Clyde Line withdrew from East Florida's inland waterways. The St. Johns River Line managed to pull through and, in October, 1931, started inland water traffic between Brunswick and Jacksonville. The company grew steadily, in spite of the national depression, and today there are one hundred trucks in place of the original one and six boats with a total carrying capacity of 1,415 tons compared with the one 65-footer with 90-ton capacity.

The first electric-welded freight boat was the *City of Sanford,* built entirely of steel in the company's own yards. Its overall dimensions are 125 x 25 feet and it draws 8 ft. when loaded with 350 tons of cargo. The power plant consists of two 150 hp. Standard Diesels with a 5 hp. Lister and a 10 hp. Stover as auxiliaries. The welded job proved highly successful and so, in 1933, the company constructed the 135 x 27-ft. *City of Orlando* with a carrying capacity of 475 tons. The two 150 hp. General Motors Diesels of the Winton type employ solid injection with an American Bosch fuel system. The engines originally employed reverse gears but are now direct-reversible. A Lister and a Stover Diesel engine drive the auxiliaries. Both the *Sanford* and the *Orlando* have an average speed of ten miles per hour. Other boats of the fleet are: the *Lake George,* formerly a lighthouse tender, 100 x 22 ft., drawing 9½ ft. loaded with 200 tons, and powered by a 175 hp. General Motors Diesel of the solid-injection type with a 5 hp. Lister auxiliary. The *Lake Dexter,* also 100 x 22 ft., draws 8 ft. loaded with 150 tons, with a 110 hp. Cooper Bessemer Diesel supplying the motive power, and again a small Lister handles the auxiliary duties. The *Ethyl Dow,* 110 x 22 ft. draws 8 ft. with a 150-ton cargo, and the *Franklin,* 65 x 22 ft. draws 7 ft. with a 90 ton load. Both these boats are powered with 100 hp. Fairbanks-Morse Diesels.

Sixty thousand tons of freight are carried each year in these six boats. Another 40,000 tons of pay load are carried by the company's fleet of trucks. It was only in recent years that Tresher became interested in the possibility of effecting savings through use of Diesel trucks. His experience with the fifteen trucks now in use has convinced him that the Diesel is far superior to the gasoline engine as an economical source of power, and there is no question that the number of Diesels in the St. Johns fleet will increase greatly in the coming years. At present there are nine Cummins Diesels, five HB 400 engines and four AA 600. In addition, there are four Buda engines, one Hercules, and one Waukesha-Hesselman. Tresher



The company is equipped to handle all its own maintenance work. At the shipyard in Jacksonville, a foreman with a crew of four takes care of all servicing and repairs required by the six boats. Most of the trucks operate out of Sanford and the company's principal garage and machine shop is located in that city.

The average daily trip for a truck is 250 miles and, on his return, the driver must fill out a detailed questionnaire covering every point on the performance of his equipment. This report is turned in to the maintenance department which checks every hint of trouble. Regardless of the reports, each truck is given a thorough inspection once a week. The service man determines whether work suggested by the driver's report needs to be handled immediately or can be left safely to the regular weekly inspection. After approximately 100,000 miles of service, an engine is taken down completely and put in first-class condition.

There you have it. In twenty years, the St. Johns River Line has progressed from a one-horse concern, nibbling at Florida's boom business, to a sizable freight operator with truck terminals at Sanford and Daytona Beach; ship depots at Palatka, Deland, Astor, Sanford, Jacksonville, and Brunswick; agencies at Ocala, Leesburg, Orlando, Winter Haven, Lakeland, Tampa, and Sarasota. It is the last of its kind in the Southeast but, with business founded on progressive sales methods and the economy of efficient Diesel equipment, it is a sturdy survival and promises to prosper.

is particularly pleased with the performance of the six-cylinder engines and expansion probably will be along that line. Most of the units are in Mack chasses.

The Diesel trucks have been pulling a gross load of 34,000 lbs. It is expected that, in 1941, the Florida law will permit a 40,000 lb. load and the present engines have sufficient reserve power to handle the increase. Trucks run about 7,500 miles per month, averaging about eleven miles on a gallon of fuel and 300 miles on a quart of lubricating oil.

The Maxi Muck Mover being loaded by a 2½ yard bucket with heavy, wet material on the Los Angeles River flood control project in Southern California. Top view shows the immense size of this 60 ton unit.

THIS huge unit, consisting of Tri Pull Tractor and Maxi Muck Mover, was designed and built by Six Wheels, Inc., especially for the efficient, off-highway movement of muck and other materials, forty yards to the load. Its gross capacity is 60 tons which it handles in all kinds of going from 2 mph. in low gear with a 43,000 lb. draw-bar pull, up to 30 mph. in high gear. The unit measures 51 feet long, overall, and has a net weight of 51,600 lbs. The Tri-Pull Tractor is powered with a Waukesha-Hesselman multifuel spark ignition engine burning Diesel oil, of six cylinders, 6¼" bore, 6½" stroke, developing 225 hp. at 1800 rpm. The developed torque is 800 ft. lbs. at 900 rpm. The engine is protected by Vortox dual intake air cleaner and Briggs Fullers earth block type fuel and lube clarifiers; essential equipment for proper operation and satisfactory engine life under the dusty conditions in which the unit is used. The Westinghouse air brakes are served by an engine driven, 12 cu. ft., air compressor of the same make. Power transmission is through an American Blower hydraulic coupling. The effect of this unit is to give smooth transmission, to absorb shocks in the driving mechanism and to reduce gear shifting to a minimum. It has been demonstrated that the overall effect of the hydraulic coupling is to greatly reduce maintenance costs and loss of time on heavy equipment of this sort. Final drive is through dual chain. Six Wheels, Inc., has been building extra heavy duty trucks for some sixteen years, especially for contractors, loggers and miners who had heavy, off-highway hauling problems. Several years ago the contractors asked for a unit that would haul the 25 to 30 yard Carry-All type scrapers at high speeds and at the time would meet the same conditions as were then being handled by crawler type tractors. The Tri Pull Tractor was the satisfactory answer. Then the contractors wanted a 40 yard, bottom dump trailer that could be handled with equal facility and the Maxi Muck Mover solved this problem. The next move is to rearrange the tractor for hauling a load on its back which will make it available for loggers and heavy industries.

THE CARE AND MAINTENANCE OF DIESEL PISTONS

By R. L. GREGORY

IN last month's issue of DIESEL PROGRESS, the writer discussed the subject of "Preventive Maintenance", stressing its application to the care of liners and cylinder walls. In this article I wish to cover briefly some of the points to be considered in the maintenance of Diesel engine pistons.

The piston of a Diesel engine is one of its most vital parts. Too often engineers and operators are prone to look upon the piston as just another part of the engine, which needs occasional attention, rather than thinking of it in the terms of the functions it performs and the abuse, so to speak, to which it is subjected in this performance.

The average engineer probably does not realize that when combustion of a fuel charge takes place, there is created a temperature varying from 2400 to 3500 degrees F. If he is aware of this fact, he probably has no conception of the enormity of the heat of 3500 degrees F. unless he stops to make some sort of comparison. For instance, ordinary steel flows at approximately 1800 degrees F. and a temperature of 3500 degrees is twice as hot approximately. Furthermore, he is probably not aware that approximately 20 per cent of the temperature created is absorbed by the piston, which fact accounts for the necessity of an assured constant supply of the cooling agent.

Pistons come under two general classifications: the trunk and the cross head types. Since we are all familiar with these types, no general description is necessary. Small high speed Diesels of smaller bore employ the trunk type piston, while engines with a cylinder bore of 16 inches or larger favor the crosshead type. There is, however, an intermediate class of Diesels, wherein either type of piston can be secured from most manufacturers. There are several reasons for employing the crosshead type of piston in the larger engines. The first reason is more tradition than anything else. When Diesels were first put on the market, engineers were familiar with the steam engine, and the crosshead, and developed the engine pistons on that basis.

Secondly, it was found in the development of larger units, that the temperatures increase to such an extent when combustion takes place that it was necessary to conduct the cooling agent directly to the piston head in order to obtain the desired cooling results. It was further found to be a rather difficult task to conduct this cooling agent to the top cavity of a trunk type piston, but an easy task to accomplish in the crosshead type.

Most manufacturers, using the crosshead type piston, construct them in two parts. The head which carries the rings is made of either forged steel or some alloy generally containing a percentage of nickel to withstand higher temperatures, and the skirt, which is of sufficient length to close off the ports when the piston is at top stroke, is usually made of cast iron. The head and skirt are then bolted firmly together, and the lower end of the skirt bolted tightly to the crosshead. A third reason for using this type of piston is that it affords some adjustment for compression by placing compression shims between the piston and crosshead.

The cooling of the head in this type of piston is accomplished as follows: A supply of lubricating oil (usually used as a cooling agent) is forced either from the crankcase, or from an independent source, depending upon the design, up through the hollow connecting rod to the crosshead pin, along this bearing to the end, and up through a pipe to the center of the piston head. From here it passes through a labyrinth baffle, so constructed to give more cooling surface, thence to the outer edge of the head, and then through a drain pipe back to the source of supply.

Where such a type of piston is used, two things are of vital importance. First, that an adequate quantity of cooling agent is always supplied to the head, and, secondly, that the path traveled by this cooling agent be maintained open and free of foreign substances. It is good practice, therefore, to occasionally pull a piston and inspect the various parts of the construction. Check the bolts, holding the head to the skirt, and the piston to the crosshead. Also check the bolts which hold the cooling nozzle to the head, to make sure that they are tight. Since the supply pipe to the center of the head is attached to the cooling nozzle which forms the well for the cooling agent beneath the labyrinth gland, it is of the utmost importance that this cooling nozzle be bolted tight to the head. Otherwise, if it works loose, vibration may result and the supply pipe might crystallize and break off, with disastrous results. Here again "Preventive Maintenance" may save a lot of grief later on.

While the piston is out, inspect the surface thoroughly. It should be well cleaned and oiled before replacement in the liner, also make sure that all oil lines supplying the cylinder wall or liner, are open and free from any carbon or foreign matter which will restrict free flow of lubricant. This can be done by working the lubricator until oil is forced out these openings.

Manufacturers locate these lubricating holes in different positions on the liner, according to their designs. Some are located below the exhaust ports, the oil being picked up by the piston on the up stroke and spread along the liner wall. Others locate the oil outlet well toward the top of the liner, the oil being picked up near the top of the stroke and spread along the wall on the down stroke, but also flowing in while the piston is on the down stroke so that the piston wipes it on the up stroke as well. It is always good practice to have a little more lubricant than is actually necessary and not try to skimp on it, as lubricating oil is cheaper than replacing pistons. Practice "Preventive Maintenance" with respect to your engine pistons.

ELLIOTT COMPANY MAKES PERSONNEL CHANGES

EXTENSIVE changes in the Elliott Company organization, recently announced, will be of interest to many DIESEL PROGRESS readers.

L. M. Forncrook, formerly Vice President and manager of the Jeanette plant is now Vice President in charge of operations at the Company's three plants. V. H. Peterson has been elected a vice president in charge of the district sales offices. L. E. Nohl has been elected a vice president and will be in charge of financial and accounting functions. W. A. Elliott is now a vice president and will be responsible for market research and purchasing. M. A. King has been appointed manager of engineering for all three plants. R. N. Williams is to manage the Blower Sales Department and T. P. Stewart has been named manager of the newly created Supercharger Sales Department which will handle turbo-chargers for Diesels.

ATLAS SALES

ATLAS Imperial Diesel sales include a four cylinder 9" x 12", 110 hp. engine for repowering the fishing boat "Sunrays" of Ensenada, Mexico. The installation was made by Atlas mechanics at Fish Harbor.

Another Atlas of the same type went to Anderson and Christofani, San Francisco builder of a 60 ft. seine boat for S. Piazza.

SUN ISSUES FOLDER RELATING LUBRICATION TO "P-Q"

A FOLDER just published by the Sun Oil Company stresses the importance, particularly at this time, of the added man-hours and machine-hours that are obtainable through the use of more efficient petroleum products. It points out how the output of present production equipment can often be substantially increased by modern petroleum products and engineering services that are immediately available to all Industry.

This folder states that a higher "P-Q" or Production Quota, is obtainable only when men, machines, and petroleum products are all functioning efficiently. It puts emphasis on the necessity for utmost care in selecting the best possible cutting oils, lubricants or processing oils for each specific job, bearing or operation. It calls attention to case histories, facts and figures showing how Production Quota increases have been secured by changing from

one petroleum product to another. And it invites consultation with Sun's technical field representatives for specific recommendations on any lubricating problem.

For a copy of this folder write Sun Oil Co., Philadelphia, Pa., and ask for "P-Q. Your Key to Increased Production."

TUTHILL APPOINTS NEW DEPARTMENT HEADS

TO keep pace with the demands for increased production on defense as well as commercial requirements, Tuthill Pump Company, Chicago, announces new appointments of executive heads, effective May 1, 1941.

According to G. B. Tuthill, president, D. L. Davis has been appointed factory manager in charge of engineering and production in the pump division, following the resignation of M. W. Huber. Mr. Davis is well known as an industrial engineer and consultant. He formerly was tool engineer with Savage Arms; chief engineer of Teetor Adding Machine Company, Des Moines; factory manager W. A. Sheaffer Pen Company; consulting engineer with Trundle Engineering Company, Cleveland; and comes to Tuthill from the Hurley Machine Company where he served as assistant works manager.

D. L. Davis

Due to the increased activity in the company's refrigeration products division, Joseph H. Ainsworth, formerly design engineer for the Hall Mfg. Co. of Cedar Rapids, has been named superintendent in charge of freezer production.

R. J. Sipe, formerly auditor of the company, has been promoted to comptroller.

AN IMPROVED V-BELT

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., pioneer in the field of multiple V-Belt transmission, has again made fundamental improvements in V-Belt structure. It announces that all its Texrope V-Belts are now of the new "Super 7" laminated design, based on the Vogt formula and abundant field experience, to include more strength and flexibility, greater service and longer life.

The cords in the new "Super 7" belts are smaller, permitting the use of more cords per belt with a resulting greater strength and less stretch. Each cord is individually imbedded in heat dissipating rubber to reduce internal belt degeneration. These belts are made in matched sets to assure uniform, smooth running, highly efficient drives. Each element of the belt is designed to fulfill an individual function. The live rubber bottom cushion absorbs the ceaseless impacts of operation. The central cord portion transmits power at the effective pitch diameter. The bias cut fabric prevents "dishing" and assures transverse stability. The 2-ply rubber-impregnated fabric cover prevents destructive agents from reaching the vital belt elements, resulting in a high grip co-efficient between belt and sheave walls.

FALK APPOINTMENTS

THE Falk Corporation, manufacturers of Speed Reducers, Flexible Couplings and other transmission machinery, announces the appointment of W. L. Schneider to the position of Vice President of Sales, T. F. Scannell to Sales Manager, and J. B. Kelley to Assistant Sales Manager.

Mr. Schneider was a graduate from Marquette University in 1925 and started at the Falk Corporation as a Sales Estimator. He has held successive positions as a Sales Engineer, Assistant Sales Manager, and Sales Manager. He is active in the work of the American Gear Manufacturers Association, formerly as Chairman of the Speed Reducer Committee and, at the present, as Chairman of the General Commercial Committee. He is a member of the American Society of Naval Engineers, and a member of the American Society of Naval Architects and Marine Engineers. Mr. Schneider, while fulfilling his new duties as a Vice President of the Falk Corporation, will continue in the supervisory capacity as Director of Sales.

Mr. Scannell, who succeeds Mr. Schneider as Sales Manager, will be responsible for the active sales of all Falk Products, except those under

the jurisdiction of the Foundry division. He is a Yale University graduate in the class of 1918. During the World War he served as an Ensign in the U. S. Navy. He spent some time with the Chain Belt Company and joined the Falk Corporation in 1928 as St. Louis Representative, later becoming District Manager of the southwest territory. Since April, 1940, he has been Assistant to the Sales Manager in Milwaukee. Mr. Scannell has also been active in the work of the American Gear Mfrs. Assoc.

Mr. Kelley was a graduate of Marquette University in 1927. Since that time he has been with the Falk Corporation first as an apprentice and later as an Estimator, Salesman, and District Manager in Cincinnati, Ohio. In recent years he has been in charge of the Falk Corporation's flexible coupling business. Mr. Kelley has been closely identified with the activities of a number of local professional and honorary fraternal organizations, and with several national engineering societies.

NEW BOOKLET DESCRIBES COUPLED REDUCTION GEARS

A NEW 8-page booklet describing coupled reduction gears for driving compressors, line shafts, generators, etc. is announced by Westinghouse Electric and Manufacturing Company.

Precision hobbing to give quiet, smooth operation is discussed with a note on the cutting of gear and pinion helices. Features such as 3-point support, even load distribution and forced-feed lubrication are explained and illustrated. Cross-section drawings marked with arrows show position of important parts and give physical dimensions.

A copy of booklet B-2278 may be secured from department 7-N-20, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

CHICAGO PNEUMATIC TOOL APPOINTS

CHICAGO Pneumatic Tool Company announces the appointment of Mr. Myron Powers as Manager of Purchases with headquarters at the General Offices, 6 East 44th St., New York, effective June 1. Mr. Powers was formerly in charge of purchases at Cleveland Plant.

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BUREAU of Supplies and Accounts, Navy Department, has awarded a contract to the Buda Company, Harvey, Illinois, to furnish Diesel engine parts to the Norfolk Navy Yard at a price of $85,625.

CONTINENTAL HEAT AND POWER CORPORATION

ANNOUNCEMENT has reached us of the formation of Continental Heat and Power Corporation, 545 Fifth Ave., New York City, with Norman Schafler as President and David Seidenwurm as Vice President and Secretary. This new Corporation will engage in the design and installation of Diesel electric generating plants, steam engines, turbines, and industrial boiler equipment. Mr. Schafler has been identified with sales, designs, and installations of a number of Diesel electric private utilities in New York City and vicinity.

A NEW PILOT LIGHT FOR SWITCHBOARDS

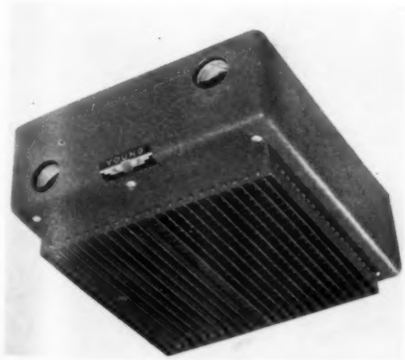
Allis-Chalmers Mfg. Company, Milwaukee, Wisconsin, has developed an improved line of indicating lamps for visual or pilot light indication on switchboards, switchgear, panels and controls. These rugged lamps are compact,

simple in construction, and require very little panel space for mounting. An outstanding feature is the use of special material in the color cap which allows less lamp voltage with equal brilliance and corresponding longer lamp life consuming only approximately four watts. The color caps are threaded and easily removed and replaced from the front of the board.

The receptacle is made of insulating material and mounts from the front of the panel through a ¾ inch hole. The resistor slips over the receptacle, taking very little space and allowing a stronger resistor construction. Strong, resilient, metal contact clips firmly hold the lamp bulb in position. The assembly mounts on any thickness of panel up to two inches, without panel counterboring. It projects less than five inches from the face surface of the panel. Binding screws provide easy means for making connections. The lamp slips into the receptacle from the front after the color cap is unscrewed. The lamp bulb may be removed or replaced without the use of tongs, wrenches, pullers or other tools.

WRITE FOR THIS

CATALOG No. 2540, recently issued by Young Radiator Company covers its extensive line of Vertiflow Unit Heaters. This is a unit



designed for use in buildings, power plants, etc., with high ceilings, which are difficult to heat with other types of heating equipment. Mounted close to the ceiling, the unit conserves floor space and prevents air stratification because the warm air which naturally rises to the ceiling is drawn into the heater and again forced down to the floor level. This equipment is of especial interest to DIESEL PROGRESS readers who plan to use waste Diesel jacket water heat for space heating. Get your free copy of Catalog No. 2540 by writing direct to Young Radiator Company, Racine, Wisconsin.

REPORTS ON NEW VANCOUVER PLANT

WHEN Dr. Paul J. Raver, Bonneville administrator, threw an electric switch at the Vancouver, Washington, Works of Aluminum Company of America May 28, he delivered the electric current necessary to place in operation the fifth unit of that Works. By this action he also called attention to the completion of a large construction project in an unbelievably short time. Less than fifteen months ago the site now occupied by the new works was a cow pasture. When the switch was thrown the capacity of the plant was increased to more than 150,000,000 pounds annually.

This figure is highly significant when one considers that the total production of all aluminum in the United States did not exceed 130,000,000 pounds per year in the last World War, and that the entire industry in the United States did not produce 150,000,000 pounds a year until 1924. Yet the Vancouver Works

will account for only a fifth of the metal to be produced by Aluminum Company of America by midsummer of 1942.

Construction of the new plant began in March a year ago. At that time the plant was designed to deliver 30,000,000 pounds of aluminum a year. But the national need for aluminum became so great that the company decided to add other units as construction proceeded. Each unit was to have an annual capacity of 30,000,000 pounds. The first unit went into operation last September, less than six months after the first concrete was poured. A second unit was completed in December. The third went into service in March, the fourth in April.

When work was begun on the plant in March, 1940, there were 39 persons on the construction payroll. Today there are more than 800 permanently employed in the manufacture of aluminum. The plant was officially opened on September 3, in the presence of Gov. Charles A. Sprague of Oregon.

The construction of the Vancouver works is part of an expansion program which approximates $200,000,000. When the program is completed in mid-summer 1942, Aluminum Company of America will be able to more than double its peak peacetime production of 1939, when more than 327,000,000 pounds of aluminum were made. The Vancouver Works is one of five aluminum-producing plants of Aluminum Company of America. In addition to these, the company has 12 other plants in which the metal is processed. Since more electricity is consumed in the production of aluminum than in any other industry, large amounts of electrical power are needed. Power contracts for the Vancouver Works were signed with the Bonneville Power Administration for a total of 162,500 kilowatts.

F-M DIESEL GENERATOR FOR ISOLATED SPOT

INDUSTRIAL Diesel engine sales by the Los Angeles office of Fairbanks-Morse & Co. include a 2 cylinder, 12" x 15", 120 hp., direct connected to a 120-208 volt F-M alternator with 5 kw. belted excitor, to the Little Colorado Trading Post, Cameron, Arizona.

OF INTEREST TO DIESEL OPERATING ENGINEERS

INSURANCE against engine shut-downs due to lube oil pressure failure, excessive cooling water temperature, and overheated bearings is available in the line of automatic safety and alarm control switches which are described and illustrated with wiring diagrams in Bulletin E-100 recently issued by Penn Electric Switch Co., Goshen, Indiana. Write the manufacturer direct for your free copy of this valuable bulletin.

AMERICAN BLOWER CORPORATION ISSUES HYDRAULIC COUPLING BULLETIN

THE Hydraulic Coupling Division of American Blower Corporation has announced a new Bulletin, No. 4419, which supersedes Bulletin No. 5025.

Profusely illustrated with halftones and blue print line drawings, this bulletin covers the

application of Hydraulic Couplings to all types of marine drives, including arrangements of coupling and gears in single, double, and quadruple propulsion engine installations. A short discussion of the factors governing selection of the proper size Hydraulic Coupling is supplemented by an elaborate horsepower speed chart, and a table of coupling dimensions is given. Copies of this informative Hydraulic Coupling Bulletin No. 4419 will be supplied to interested DIESEL PROGRESS readers upon request to Hydraulic Coupling Division of American Blower Corporation, 6000 Russell St., Detroit, Michigan.

CUMMINS DIESEL SALES ON WEST COAST

DIESEL Motor Sales and Service Corp., Los Angeles, Cummins Diesel engine distributors, announce the following sales: Model HB, 6 cyl., Signal Trucking Co., (2); Camillo Bros., (3); Riverside Cement Co., (1); Schumacker Wallboard Co., (1); Clark Sargent, (1), for truck installation; Fritz Ziebarth, (1) for pumping service; Six Wheels Inc., 4 four cyl., Model HB, for hoists, and Republic Supply Co., (2) same model, for oil drilling.

THE "Oleander," a twin screw, 73 ft. Diesel propelled Coast Guard Cutter, was launched at the yard of the Jeffersonville Boat & Machine Co., Jeffersonville, Ind. This was built at a cost of $68,000 and will be assigned to duty on the Ohio River.

LORIMER DIESEL FOR SHARK FISHER

THE new hook-and-line boat built by the Genoa Boat Works, San Francisco, for the father and son combination, Vince and Domin Ortisi, is powered with a 30 hp. Lorimer Diesel, pushing the "Simona Ann" at seven knots. The 33 ft. craft will fish principally for sharks.

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BIDS for the construction of a Diesel-electric steel utility boat have been opened by the United States Army Engineer office at San Francisco. The following companies replied:

Berkeley Steel Construction Co.	
San Francisco, Calif.	$114,800
Alternate bid	117,800
Basalt Rock & Shipbuilding Co.,	
Napa, Calif.	135 000
Colberg Boat Works, Stockton, Calif.	160,550

UNION DIESELS FOR WEST COAST VESSELS

CAMPBELL Machine Company, tuna-clipper builders of San Diego, are installing main Union Diesels in three vessels now under construction. Hull No. 67, a 66-footer for Rocco Parmigiani and Co., 6 cyl., 175 hp., with 4 cyl., 45 hp., Hill Diesel and a 4 cyl., 45 hp. Hercules Diesel as auxiliaries; Hull No. 69, 108 ft., for Tavaras and Ferriara, 6 cyl., 350 hp., with a 150 hp., 6 cyl., Union Diesel driving two 100 kw. General Electric generators; Hull 70, 128 ft., for Vattuone and Sons, 6 cyl., 450 hp., supercharged to 700 hp., and two 6 cyl., 200 hp. Union Diesels with 125 kw. G. E. generators.

F-M MODERNIZES PLANT *and* ADDS A NEW DIESEL

THE Santa Catalina Island Light and Power Co., Avalon, is rushing construction work on their new plant at Pebbly Beach, and this necessitates the building of a new transmission line for island service. When completed, the plant will be completely Fairbanks-Morse equipped with a total of 3,260 hp. divided into six power units, including the new 575 hp. Diesel-electric generating set.

A feature of the project will be modernization of the present five-engine installation, bringing them up-to-date and modern as the new unit to take its place on the line. This is accomplished by incorporating improvements in existing engines right on their original bases with the installation of new cylinders and parts at a nominal cost. The result is higher efficiency, lower fuel and lube oil cost, and a saving of new engine installation. The project is expected to be completed by the early part of September.

SMITH NAMED SALES MANAGER FOR READY-POWER COMPANY

H. D. Gumpper, President of The Ready-Power Company, Detroit, Michigan, has announced the recent appointment of Arch R. Smith as the Company's Sales Manager. The Ready-Power Company manufactures gasoline-electric power units to replace batteries on electric industrial trucks and tractors, and stationary and portable gasoline and Diesel electric lighting and power plants.

Mr. Smith who was formerly manager of the Industrial Sales Division of the Continental Motors Corporation, has had many years of sales experience in the material handling field.

FAST NEW SPORTFISHER

CUMMINS powered, Frank Wilson's new 65 ft. sportfisher of Santa Monica, Calif., is reported to make fifteen knots at 1800 rpm. of her twin supercharged 6 cylinder, 200 hp. Diesels. These engines are equipped with Ross heat exchangers, Twin Disc reduction gears, Morflex shaft couplings, Tobin bronze shafts, Coolidge wheels, and Hobbs batteries.

VENN-SEVERIN DIESEL FOR IRRIGATION

THE Compania Industrial Jabonera del Pacifico has purchased from the Venn-Severin Diesel Distributors Inc., Los Angeles, a 2 cylinder, 7 x 8, 40 hp., Diesel to be installed on one of their large ranches 50 miles below Mexicali, Mexico. It will supply power for a Pomona turbine pump delivering 16,000 gpm. from stream to ditches for irrigation purposes.

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AN order for three sets of propelling machinery for submarine tenders, at a cost of $5,853,000, was recently placed by the Navy Department with the General Motors Sales Corporation, Cleveland, Ohio. Another contract to furnish ten sets of propelling machinery for fleet tugboats, now building, has been placed by the Navy Department with the same company. This order amounts to $4,300,000.

DIESEL-ELECTRIC SWITCHERS SOLVE A PROBLEM FOR SOUTHERN PACIFIC RAILROAD

IN common with all railroads, the Southern Pacific is experiencing a rapid acceleration in its freight shipping. Realizing that the rapid upswing of business might cause a shortage of freight steam power, and also realizing the long time required for delivery of new steam locomotives, the Southern Pacific inquired for twenty-five 1000-hp. Diesel-electric switchers.

The quick delivery which could be had on the Diesel-electrics made it possible to release steam locomotives for road service. Such a release was not on a basis of one-to-one, however; the availability factor of the Diesel-electric switcher is so much higher than that of the steam locomotive that the twenty-five new Diesel-electrics are releasing thirty-five steam locomotives for road service.

Ten of the Diesel-electrics are Alco-G.E., built jointly by the American Locomotive and General Electric companies; ten are Electro Motive; and five are Baldwin.

FAIRBANKS-MORSE & Co., Los Angeles, announce the following Marine Diesel sales:

To Tony Bregente and Ed Hollinger, for installation in a 78 ft. purse seiner, a 6 cylinder 10" x 12½", 240 hp. at 400 rpm. Diesel. Auxiliaries are two 60 hp., 4¼" x 6" F-M Diesels, direct connected to 40 kw., 125 volt F-M generators.

To owners of fishing vessels, "Juanita" and "Georgia," one each, 2 cylinder, 4¼" x 6" Diesel for ice machine operation aboard the "Juanita," and auxiliary power for trolling operations of the "Georgia." Main engines of both vessels are F-M.

TWO NEW WEST COAST CRAFT

TWO jobs of wide variance to each other whose specifications call for Diesel engines are under construction at Fellows and Stewart yard, Terminal Island. One is for a 96-ft. barge for the Kelco Co., San Diego, to be powered with two Fairbanks-Morse 6 cylinder, 180 hp. main engines, and an auxiliary Diesel, direct connected to a 240 volt F-M generator set with 1½ kw. direct connected exciter. The other is a 47 ft. water taxi for Captain Bill Clark, Santa Monica. Twin-110 hp. Superior Diesels are on order for this craft.

AT the yard of John H. Mathis & Co., Camden, N. J., the first pulp carrying vessel of the Scott Paper Company of Chester, Pa., the "Arthur Hoyt Scott", was launched May 28. This is the largest ship ever built at this yard, having a maximum displacement of 5,270 tons and a cargo capacity of 3,500 tons. The dimensions are 269 ft. long, with a beam of 42 ft. 6 in., and a draft of 20 ft. 6 in., and has accommodations for a crew of twenty-two, an owner's stateroom, a guest stateroom, and hospital quarters.

The "Arthur Hoyt Scott" will transport wood pulp from the company's plant at Nova Scotia and from Brunswick, Ga., to Chester, Pa., making the round trip in twenty-five days. She is powered with a direct connected Cooper-Bessemer, 1300 hp. Diesel and has a speed of 10½ knots. She is a single screw type and has three cargo holds and will be equipped with cargo-handling facilities, both on and off the ship.

CHICAGO PNEUMATIC EXECUTIVE HONORED BY NEW YORK SALES MANAGERS' CLUB

William Johnson Appointed New Secretary

LESLIE S. Gillette, an executive of Chicago Pneumatic Tool Co., was re-elected President of the New York Sales Managers' Club for a second term, it was announced today by the nominating committee. The election of new officers was held coincident with the celebration of the 25th anniversary of the club. This is the oldest organization of its kind in the country being founded June 23rd, 1916.

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THE "Dogwood" and "Sycamore," Coast Guard Cutters under construction at the Dubuque Boat & Boiler Works, Dubuque, Iowa, were launched June 16, and will be used on the Mississippi River as tenders. These two boats are twin-screw, 113 ft. 9 in. long, with a displacement of 220 tons. They are powered by two Diesel engines developing 400 shp.

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THE Sun Oil Company has contracted for a vessel to be 485 ft. long, 68 ft. beam, and 36 ft. deep, with a cargo capacity of 156,840 barrels of oil, to be built by the Sun Shipbuilding and Dry Dock Company. The power plant will be a Sun-Doxford Diesel engine with 7500 hp. A speed of 15½ knots will be attained.

Latest Diesel Patents

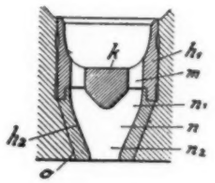
A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

Conducted by C. CALVERT HINES*

2,205,751
DIESEL ENGINE

Hans Scherenberg, Stuttgart-Unterturkheim, Germany, assignor to Daimler-Benz Aktiengesellschaft, Stuttgart-Unterturkheim, Germany

Application October 21, 1937, Serial No. 170,179
In Germany November 4, 1936
5 Claims. (Cl. 123—33)

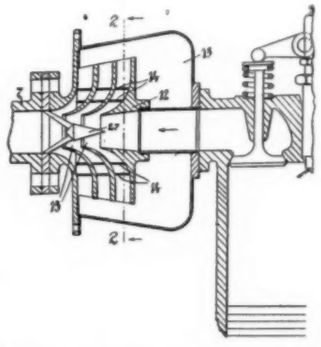


1. In an internal combustion engine of the Diesel type a main combustion space, a precombustion chamber communicating therewith, means for injecting fuel into said precombustion chamber, means intermediate said precombustion chamber and said main combustion space comprising a heat storing core piece, a plurality of passages adjacent said core piece communicating with said precombustion chamber, and a nozzle connected to said passages and discharging into said main combustion space, said nozzle comprising a conduit connecting said passages with said main combustion space, said conduit converging gradually to a point near its end adjacent the main combustion space and formed with a substantially cylindrical portion at its end adjacent the main combustion space.

2,198,730
EXHAUST PASSAGE OF TWO-STROKE INTERNAL COMBUSTION ENGINES

Michel Kadenacy, Paris, France, assignor to Armstrong Whitworth Securities Company, Limited, London, England

Application June 1, 1936, Serial No. 82,959
In Great Britain January 11, 1936
6 Claims. (Cl. 60—32)



1. Method of controlling two-stroke cycle internal combustion engines, which comprises establishing communication between the cylinder

* Patent Attorney, 811 E Street, N.W., Washington, D. C.

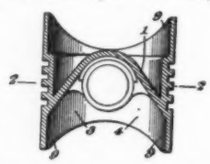
and exhaust system during the firing stroke, providing for the issuance of the burnt gases from the cylinder substantially as a mass in an interval of time shorter than that which would be required for the burnt gases to expand down to the ambient pressure by adiabatic flow, whereby the mass of gases moves outward and thereafter returns, permitting the free and unrestricted outward motion of the issuing mass of burnt gases, pushing before it all the gases in its path until it reaches a predetermined position in the exhaust system which is located not further from the cylinder than the zone from which the return of the burnt gases would occur, and at such position imparting a gyratory motion to the said gases as a whole, which all rotate substantially in said position so that any subsequent rectilinear motion of the gases is hindered until the exhaust orifice is closed, maintaining the admission orifice closed until the said issuance of the mass of burnt gases is in full progress and admitting fresh charge into the cylinder when the said issuance of the burnt gases is in full progress and causes a suction effect to be exerted in the cylinder, while the exhaust port is still open.

2,193,920

COMPACT, KNOCKLESS, COCKLESS, PIN PISTON

William Joseph Frederick, Battle Creek, Mich. Application July 12, 1937, Serial No. 153,134

4 Claims. (Cl. 123—193)



1. A piston comprising a longitudinal tubular shell, piston pin bosses integrally joined to said tubular shell, piston pin bearings in said bosses, said bearings having a common centerline which crosses the longitudinal centerline of said tubular shell at right angles, a combustion head within said tubular shell, said combustion head being curved downward over said bosses and joined to the inner circumference of said tubular shell in manner lowering the effective compression point of the upper face of said compression head, cooling fins mounted on said bosses below the compression head, and piston ring grooves on the outer circumference of said piston tubular shell equally grouped above and below a plane through the centerline of said piston pin bearings and perpendicular to the longitudinal centerline of said tubular shell, the parts of said piston being so arranged that in final form, the piston will be balanced about a point exactly coinciding with the point of intersection of the centerline through said piston pin bearings and the longitudinal centerline of said tubular shell.

ADVERTISING INDEX

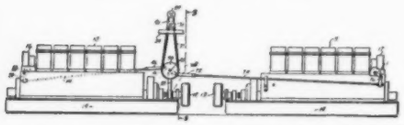
2,196,696

ENGINE CONTROL MEANS

Robert I. Dick, Beloit, Wis., assignor to Fairbanks, Morse & Co., Chicago, Ill., a corporation of Illinois

Application December 18, 1936, Serial No. 116,501

(9 Claims. (Cl. 74—479)



1. In combination with a plurality of internal combustion engines each provided with a speed governor, control means for one of said governors, operable at a distance from said engines, a control means for a second governor, including a rotatable member, an actuating element connectible between said member and second governor and operating means for said member, operable remotely from said engines, and means adapted for selectively connecting said first control means to said actuating element for concurrent control of said governors.

2,188,902

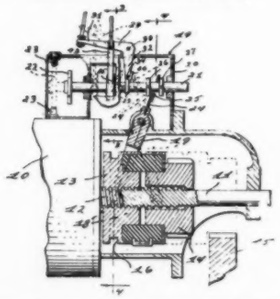
STARTING SYSTEM FOR INTERNAL COMBUSTION ENGINES AND THE LIKE

Jesse S. Kauffman, Detroit, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application April 20, 1933, Serial No. 667,049

Renewed February 18, 1938

22 Claims. (Cl. 123—179)



1. An engine starting system having in combination, an electrically operated starting motor, a driven gear wheel, a pinion on the motor shaft axially movable relative to the latter into and out of mesh with said gear wheel, a switch controlling the operation of said motor, a manually operable control for urging said pinion in a direction to mesh the same with the gear wheel, and means for preventing movement of the pinion in the aforesaid direction until said switch is closed.